JPRS-UFM-87-006
17 SEPTEMBER 1987

FOREIGN BROADCAST INFORMATION SERVICE

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Soviet Union

FOREIGN MILITARY REVIEW

No 4, April 1987

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JPRS-UFM-87-006

17 SEPTEMBER 1987

SOVIET UNION

FOREIGN MILITARY REVIEW

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[Except where indicated otherwise in the table of contents the following is a complete translation of the Russian-language monthly journal ZARUBEZHNOYE VOYENNOYE OBOZRENIYE published in Moscow by the Ministry of Defense.]

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PUBLICATION DATA

English title	:	FOREIGN MILITARY REVIEW, No 4, 1987
Russian title	:	ZARUBEZHNOYE VOYENNOYE OBOZRENIYE
Author (s)	:	
Editor (s)	:	I. I. Bugrov
Publishing house	:	Krasnaya zvezda
Place of publication	:	Moscow
Date of publication	:	April, 1987
Signed to press	:	3 April, 1987
Copies	:	

RESTRUCTURING AND PARTY PERSONNEL POLICIES

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 87 (Signed to press 3 Apr 87) pp 3-6

[Unattributed article under the rubric "The Course of the 27th CPSU Congress": "Restructuring and Party Personnel Policies"]

[Text] The entire experience of socialist and communist construction shows that the guarantee of our success is the wise and tested leadership of the Communist Party, its steadfast loyalty to Marxist-Leninist teaching and the Leninist principles of party construction. A powerful factor through which the party influences the course of social development is its personnel policies.

The question of restructuring CPSU personnel policies was examined at the January 1987 CPSU Central Committee Plenum within the broad social and economic scheme, taking into account the lessons of the past, the time we live in and tasks for the future.

General Secretary of the CPSU Central Committee Comrade M. S. Gorbachev noted in his presentation "On Restructuring and Party Personnel Policies" that immediate, fundamental changes in working with personnel are needed in formulating the party's course in accelerating social and economic development of the country, in solving problems of economic intensification, improving management of the economy, and strengthening order in all aspects of social life. A thorough restructuring of personnel activities is necessary--we need the full output of all workers, whatever their field of labor.

Personnel policies are class policies. They are directed towards protecting the interests of the working class and all the Soviet people, interests which are today expressed in the systematic, comprehensive development of socialism, and in the establishment of prerequisites for the subsequent progression to communism, based on the accelerated social and economic development of the country. Through its personnel policies the party strengthens the positions of the working class in all its leading elements. The party's political experience, ideology, high degree of consciousness, will, intolerance to shortcomings and sense of social justice organize and unite our entire society. They permit us to look to the future with confidence and optimism.

It was stressed at the plenum that in the seven decades that have passed since the victory of Great October, our country has achieved outstanding successes in every sphere of social life. These are a rightful source of pride to the Soviet people and constitute a solid foundation for proceeding along the strategic path to accelerated development.

But the achievements and successes should not conceal the contradictions, mistakes and omissions in the development of society. At a certain stage the pace of our country's forward progress began to slacken. Difficulties and unresolved problems began to accumulate. Stagnation and other phenomena foreign to socialism began to appear.

Of course the country's development did not cease. Tens of millions of people toiled honestly. Many party organizations and personnel worked intensely. All of this served to restrain negative processes, but they were not prevented from occurring.

Under such circumstances, the Communist Party has found within itself the strength and fortitude to adopt the course of restructuring, to lead this effort and organize the work--revolutionary in its nature--necessary to accomplish it. The restructuring of Soviet society has irrevocably begun. The first political result can be seen in the fact that major changes are taking place in the life of the country. Positive trends are gathering strength. The political import of the 27th CPSU Congress and practical party efforts to implement its decisions are receiving the powerful support of the Soviet people. The January 1987 CPSU Central Committee Plenum has armed the party and the people with an integral concept of restructuring, as well as a comprehensively based program of action to implement it.

As Comrade M. S. Gorbachev noted in his presentation, restructuring comprises the decisive subjugation of stagnation processes, a crippling of the mechanism that inspires obstacles, and the creation of a reliable and effective mechanism for accelerating the social and economic development of Soviet society.

Restructuring is reliance on the active creativity of the masses, continued intensity of the factors promoting development of the Soviet economy, a decisive turn towards science and its partnership with practical effort so as to achieve the greatest final results, and priority development of the social sphere, satisfying more fully the needs of the Soviet people.

Restructuring is the energetic effort to rid society of distorted socialist morals. It is the consistent implementation of principles of social justice, unity of word and deed, of rights and obligations. It is the eminence of honest, high-quality labor and the elimination of equalizing trends in work remuneration.

The final goal of restructuring is tne thorough renewal of all aspects of the life of the country, imbuing socialism with the most modern forms of social organization. It is the fullest possible disclosure of the humanistic nature of our system in all its decisive aspects--economic, social, political and moral.

It is especially important today, when the restructuring effort is in its intial stage, to espouse realistic positions based on an objective appraisal of what has been accomplished, to look at the results of our labor, proceeding from the announced plans and promises of the party.

The party requires restructuring to take place at every work place, in every labor collective, in the sphere of management and in party and state agencies. First and foremost, restructuring means increasing exactingness of oneself and one's work. Today is the time for decisively overcoming inertia and complacency, for taking energetic action to implement plans charted by the party. Creative labor, a high degree of organizational ability and discipline, and the rendering of wholehearted effort mark the path leading to genuine success in accomplishing the tasks assigned by the party.

Restructuring has become an integral part of the life of our armed forces. Today we are right to be talking about elements of the new thought and psychology of action, about innovative spirit and the striving for creativity and initiative which is becoming all the more clearly manifest in a greater number of servicemen.

It was noted at the Central Committee plenum that acceleration is possible only with an all-encompassing activation of the human factor and the further development of democracy. Herein lies the essence of the party's course towards strengthening the socialist self-government of the people. It is democracy that makes it possible to include in restructuring socialism's most powerful constructive force--the free labor and free thought of the people in a free country. This process has already begun. Every aspect of the life of society is becoming democratized. The life of our party organizations is becoming more full-blooded. Openness, criticism and self-criticism are spreading. The mass information media are becoming more active.

It was noted at the CPSU Central Committee plenum that primary significance should be attached to the development of democracy in production. We must create such conditions and introduce such forms of organizing production and the life of our labor collectives so as to allow each worker to feel like a genuine owner of his enterprise. Socialist democracy does not exist outside the law or above the law. It has nothing in common with all-permissiveness, anarchy or irresponsibility. Its role is to serve man, the collective and society in practical fashion, to develop workers' initiative.

A new step forward can be seen in democratization of the process of selecting management personnel based on the general use of elective principles in labor collectives. Not only does the electivity of management employees in production not undermine unity of command--it strengthens it. An intrinsic combination of unity of command and collective leadership reinforces and develops the Leninist principle of democratic centralism and planned, centralized management supported by the collective, by the masses.

It must be emphasized that the main, determining feature of socialist democracy is the intrinsic combination of democracy and discipline, independence and responsibility, rights and obligations of responsible individuals, and of all citizens. As was pointed out at the Central Committee

plenum, the effectiveness of genuine democracy depends on the breadth of its social base, and on what efforts and opportunities are employed to broaden it. In this regard the Central Committee turned its attention to participation of the younger generation, especially the Komsomol, in accomplishing the tasks of restructuring. Our youth must become energetic participants in effecting this change.

Not a single fundamental question--to include the broadening of democracy--can be resolved without taking into account the multi-national composition of the population of our socialist state. It is socialism which put an end to national oppression and injustice, to infringement of people's rights based on national prejudices. It is socialism which has guaranteed the economic and spiritual progress of all nations and peoples. The entire atmosphere of our life and joint labor, the family and school, the army, culture, literature and art all have the purpose of inculcating the most noble feelings in the Soviet people--first and foremost in our youth--of all nationalities, feelings of internationalism and Soviet patriotism.

Success in the restructuring effort in our country and in the Soviet Armed Forces is determined to a decisive degree by how swiftly and thoroughly party, soviet and military cadre grasp the necessity for the changes, and by how creatively and purposefully they implement party policy. Great significance is attached in today's conditions to the moral make-up and competence of workers, to their high degree of professionalism, their unwillingness to tolerate shortcomings and indifference, and their adherence to modern and progressive ideas.

Five taskings for working with personnel were formulated by Comrade M. S. Gorbachev and announced in his presentation at the Central Committee plenum: to resolve pressing personnel issues in timely fashion, insure continuity in management and a continuous influx of fresh abilities; to never underestimate political and theoretical training or the moral and ideological toughening of cadre and more swiftly overcome technocratic work styles; to eliminate personnel stagnancy just as readily as personnel reshuffling; to reinforce responsibility for one's assigned duties, increase discipline and create an environment of mutual exactingness; finally, to overcome weaknesses in democratic principles, disparagement of certain elective organs and serious dereliction in the activities of party and state supervisory organs.

Military cadre play an important role in accomplishing the tasks of developing socialism and reliably defending it. The Soviet Union is following a steady course of construction and peace. It has undertaken the task of reducing international tension, lessening the military danger that exists, and ridding the world of the nuclear threat which has appeared as a result of the aggressive policies of imperialism, primarily those of the United States. The 27th CPSU Congress particularly stressed the necessity for new political thought in this nuclear age. The Soviet Union has proposed a number of major initiatives, supported by nations of the socialist community and directed towards a fundamental normalization of international relations. These include, among other initiatives, a program for eliminating nuclear weapons from the planet by the year 2000 and a moratorium on nuclear explosions.

Ruling circles in the United States and the other NATO countries are continuing the arms race to please the military-industrial complex. They are striving to destroy the existing military-strategic balance. Their policy remains imperialistic, reckless and aggressive, directed towards further building up a first-strike potential and obtaining the "right" to blackmail our country and all of mankind. Their military preparations are covered by a noisy and slanderous campaign regarding "the Soviet military threat," and by all kinds of fabrication as to imaginary violations of obligations by the Soviet side.

American political and military leaders are relying first and foremost on the improvement and development of their strategic offensive forces. These include the MX and Midgetman intercontinental ballistic missile, the sea-based Trident nuclear missile system, the strategic B-1B bomber and "invisible" aircraft constructed under the "Stealth" program. Chemical warfare and other forms of mass destruction occupy an important position in the Pentagon's plans. At the same time, the "star wars" program is being pushed, comprising first and foremost a plan to construct an "anti-missile shield" in space. The essence of such a concept is far from defensive in its nature, as opposed to what U.S. leaders have been attempting in every conceivable way to show. They are counting on this program to provide them an invulnerability through which they may inflict a first strike with impunity from under this "shield."

Under the conditions of today's complex, dangerous and, to a great degree, contradictory international environment, the USSR has been required to strengthen its defensive capabilities and increase the combat readiness of its armed forces. The 27th CPSU Congress has again confirmed the defensive nature of Soviet military doctrine, pointing out that the Soviet Union does not desire greater security for itself at the expense of others, but that it will never agree to less. While there exists the threat of aggressive wars and military conflicts being unleashed by imperialism, the party will devote assiduous attention to consolidating the defensive might and security of the Motherland, and to increasing the readiness of the Soviet Armed Forces to crush any aggressor.

The CPSU Central Committee has a high appraisal of the activity of the military cadre and servicemen of the Soviet Army and Navy who are reliably protecting the peaceful labor of the people and the security of the Motherland, those who are fulfilling their international duty with honor. Thanks to the attention of the party and people, our armed forces have been provided everything necessary to successfully accomplish the tasks which face them--they have sophisticated armament and military technology at their disposal; they have well-instructed personnel, well-trained command and political cadre selflessly devoted to the people.

It was stressed at the January 1987 CPSU Central Committee Plenum that the Central Committee relies heavily on the Soviet officer corps in accomplishing the tasks of consolidating the country's defensive capability. Matters related to further increasing the quality of military and political readiness and issues of strengthening organization and discipline are always the focus of attention of commanders, political organs, party and Komsomol organizations. Executing the decisions of the 27th party congress, they have

manifested greater exactingness, efficiency and adherence to principle in their efforts. They are boldly specific in their activity; they display a unity of word and deed, a closeness to people. They realize that only new approaches, bold and innovative decisions, the ability to work wholeheartedly with foresight, organization and discipline can enable us to move forward.

To intensify restructuring means to increase the personal responsibility of every serviceman, communist and Komsomol member for quality accomplishment of the tasks we face. It means not permitting any lag in improving our activity in all areas of personnel instruction and training, of political and educational work with people.

The year following the 27th CPSU Congress has become a year of renewal. The passage of time has shown that success comes to those who do not allow any gap between word and deed, to those who have drawn the conclusion that thinking and working the new way called for by the party is primarily thinking and working in the Leninist fashion.

1987 is an especially remarkable year. It is the 70th anniversary of the Great October. It is the year which will play a most important role in implementing the party's strategic policy towards acceleration. The task of all cadre is to consolidate what has been achieved in the first year of the five-year plan and proceed further, to more fully include long-term economic growth factors in our work, to make positive, tangible and irreversible improvements in all spheres. As stated at the CPSU Central Committee plenum, restructuring is not a walk down a paved road. It is a hike up into the mountains, often along an untrodden path. It requires tremendous creative effort in an extended, selfless struggle. We must take the great cause of restructuring to its conclusion as demanded by the time in which we live. This entails working wholeheartedly to implement party policies with respect to the country's security and defense, persistently increasing the level of technical training and practical skills of personnel in the use of weapons and combat equipment, and tenaciously striving to insure that the level of ground, sea and air training, as well as the quality of mission accomplishment, meets today's demands to the fullest extent. This means fighting more actively to radically consolidate military discipline and further unite military collectives. It means reaffirming military order according to the regulations in each subunit.

Like our country as a whole, the armed forces are in the initial stage of restructuring. Serious work needs to be accomplished in strengthening and developing it. We must objectively evaluate what has been achieved, correct our errors in decisive fashion and seek new methods in fulfilling the mission of enhancing combat readiness in the Soviet Armed Forces.

9768
CSO: 1801/182

FRANCE'S RAPID DEPLOYMENT FORCES

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 87 (Signed to press 3 Apr 87) pp 7-12

[Article by Major A. Vasilyev: "France's Rapid Deployment Forces"]

[Text] In spite of France's departure from the NATO military organization in 1966, the military and political course she has adopted in recent years, especially after the formation of a government of right-wing parties, is characterized by more active military participation with the North Atlantic alliance. Statements by representatives of the French leadership and the direction France's combat and operational training has taken with regard to her headquarters and troops give foreign experts reason to believe that, in the event of armed conflict in Europe, France will enter the arena on the side of NATO. These experts believe that France's non-participation in the military organization of the alliance is purely formal in nature.

As noted in the foreign press, there is an increasingly perceptible tendency in the country to broaden the scale of military preparations. The new 1987-1991 military program envisages further development of French strategic nuclear forces, especially sea-based forces, tactical nuclear weapons and conventional arms. A huge amount of money--474 billion francs--has been allocated to implement this program. France's 1987 military budget represents almost a seven percent increase over that of the previous year.

Under the pretext of defending her "vitally important interests," France has initiated military activity in the 1980's outside her territorial boundaries. Franch troops participated in military actions in Lebanon and Chad (1983), and in Chad and Togo (1986). Today France is again using her armed forces to interfere in the internal affairs of Chad. Striving to defend her neo-colonial interests in various regions of the world and to satisfy her need for a special troop contingent for carrying out high-mobility combat operations in Europe, France's military-political leadership proceeded in 1983 to create "rapid deployment forces (RDF)."

French military authorities maintain that their RDF must be prepared to take part in operations of NATO's combined armed forces in the Central European theater either independently or as part of the First French Army. They must be ready to protect France's interests beyond the European continent--chiefly

in the African countries--and also conduct territorial defense missions, if necessary. The RDF fall within the organization of the ground forces but are operationally subordinate to the chief of staff of the armed forces.

RDF units form a separate command (headquarters at Maisons-Laffitte in the Paris suburbs) consisting of five divisions, a rear brigade and communications regiment. The command numbers about 50,000 men. They have approximately 350 field artillery pieces and mortars, over 500 anti-tank guided missile launchers and 240 helicopters, 90 of which are anti-tank.

The Ninth Infantry Division ("Marine") has 8,000 men. It consists of a command and logistics regiment, four motorized rifle regiments (each with 6 120-mm mortars, 8 81-mm mortars, and 24 Milan ATGM launchers), an armored cavalry troop (24 Milan ATGM launchers, 36 ERC-90S armored reconnaissance vehicles with mounted 90-mm cannon), an artillery battery (24 155-mm guns) and two engineer companies. The division has 80 cannons and mortars, 120 ATGM launchers and 36 recon vehicles in all.

The 27th Alpine Infantry Division numbers 9,000 men. It consists of a command and logistics regiment, six alpine infantry battalions (each with 6 120-mm mortars, 6 81-mm mortars and 14 Milan launchers), an armored cavalry regiment (24 Milan launchers, 36 ERC-90S recon vehicles), an artillery battalion (24 105-mm howitzers) and an engineer battalion. (In all--96 cannon and mortars, 108 ATGM launchers, 36 recon vehicles).

The 11th Airborne Assault Division (13,000 men) consists of a command and logistics regiment, six parachute regiments (each with 6 120-mm mortars, 8 81-mm mortars and 24 Milan ATGM launchers), reconnaissance (36 Milan launchers, 36 ERC-90S), artillery (18 120-mm mortars) and engineer units, and an air-mobile rear base--in all, 102 mortars, 180 ATGM, 36 recon vehicles.

The Sixth Armored Cavalry Division (7,500 men) consists of a command and logistics regiment, two motorized rifle regiments (each with 6 120-mm mortars, 8 81-mm mortars, 24 Milan launchers), two armored cavalry (each with 12 "Haute" ATGM launchers on VAB armored personnel carriers, 36 AMX-10RC armored reconnaissance vehicles armed with 105-mm cannon), an artillery (24 155-mm cannons) and an engineer unit. In all--52 cannons and mortars, 72 ATGM launchers, 72 armored reconnaissance vehicles and about 350 armored personnel carriers.

The Fourth Air-Mobile Division (6,000 men) consists of a command and logistics regiment (60 helicopters of various purposes), three army aviation regiments (each with 60 helicopters, including 30 anti-tank and 10 fire-support), and an air-mobile motorized rifle regiment (12 120-mm mortars, 48 Milan launchers). In all, the division has 240 helicopters (including 90 anti-tank, 30 fire-support, over 70 transport).

The rear brigade (6,500 men) may have a heavy transport regiment (under centralized command, attached for the period of operations), transport regiment, six companies (two for hauling combined POL, two ambulance, one quartermaster, one maintenance/repair), an ambulance squadron and 11 mobile field hospitals (2,000 vehicles in all).

French military authorities are devoting a great deal of attention to RDF mobility. The means, amount and duration of RDF deployment depend on the remoteness of the area of operations, composition of forces and materiel to be employed, nature of the mission, and the quantity, tactical and technical features of the military transport vehicles. Foreign press reports describing local RDF operations and exercises lead us to believe that RDF units and subunits will be transported to operational deployment areas outside the European continent basically by air and by sea; within the European theater--by air, railroad and motor vehicle. Air transport planning calls for the use of air force assets--about 60 C-160 Transall aircraft, 6 DC-8 and up to 20 Nor-Atlas. French military authorities believe their air force military airlift capabilities are insufficient for rapid deployment of a significant troop contingent to operational areas, especially outside Europe. For example, the Transall C-160 aircraft can airlift a maximum of 16 tons, but when hauling over great distances (5,000 km and more) its capability is almost cut in half.

French military authorities decided to develop and add to their inventory a transport aircraft with significant load-carrying capacity and great operational radius without refueling. Mindful of their limited military airlift capabilities, in emergency situations France's military calls upon civil aviation aircraft and the military air transport of their NATO allies for transporting RDF units and subunits. Thus, the "Manta" operation used Air France Boeing 747 aircraft to transport French troops to Chad in 1983. Over the course of 20 days, 26 C-160 Transall and Boeing 747 aircraft transported about 3,000 men and 3,500 tons of cargo to Chad. Naval transport was used to deliver AMX-10RC armored reconnaissance vehicles to Libreville (Gabon). American C-5 Galaxy military transport aircraft were used to transport heavy armament to Chad in 1986 (Operation "Epervieux").

Troop transport by sea is accomplished using Foch and Clemenceau aircraft carriers in the navy inventory, the Jeanne d'Arc helicopter carrier, two amphibious warfare ships of the "Uragan" [hurricane] variety, and about 15 tank landing ships of various types. At the start of the 1990's, France's navy plans to add to its inventory three new commando helicopter amphibious craft of the TCD90 variety, chiefly for RDF missions.

On the whole, foreign experts believe that France's military transport capabilities allow her to effect rapid deployment of a limited troop contingent outside Europe, mainly to Africa--considered one of the chief regions for operational RDF deployment--for fulfilling small-scale, local conflict missions. France's military presence in Africa (about 15,000 men in the Central African Republic, Ivory Coast, Senegal, Gabon, Djibouti and Chad), however, will permit her to reinforce the RDF contingent deployed from France.

The movement of rapid deployment force units to operational areas within the Central European theater can be accomplished relatively swiftly, thanks to the high degree of mobility of the 11th Airborne and 4th Air-Mobile divisions, and the sufficiently great movement capabilities of the remaining RDF divisions over the well-developed road network of Western Europe, in view of the relatively small distances involved. At the same time, French military authorities admit that the transport of materiel necessary for RDF combat

operations in the Central European theater (daily requirements, according to military experts, amount to 100 cubic meters of fuel, 20 tons of ammunition, 3 tons of rations, 20 tons of drinking water, 5 tons of repair parts, and up to 2 tons of additional supplies) entails significant difficulties. Taking this into account, France is investigating the possibility of using her NATO allies' rear logistics and supply system in this theater for her RDF purposes.

Principles and modes of employment for the rapid deployment forces have been developed over the course of their organization and operational preparation.

Airborne operations of various scales are considered a basic form of RDF employment beyond NATO borders. In particular, a variant of combined air-sea assault operation was developed at the "Farfadet-85" exercise (over 15,000 troops) and carried out in the following sequence--tactical airborne assault conducted deep in enemy territory, then an amphibious assault undertaken after careful preparation and its success exploited by deploying air-mobile forces based on an aircraft carrier.

The question of employing RDF assets in the Central European theater is given special attention. Foreign experts believe that the general direction of RDF operational and combat training and the nature of problems worked out during exercises provides a possible indication of their prospective use as a reserve for NATO's supreme high command in Europe. Full-strength RDF employment, however, is not likely according to these experts, insofar as the divisions of which they are comprised are diversified. Western military experts are looking at the possibility of using chiefly the 11th Airborne Assault Division, 4th Air-Mobile Division and 6th Armored Cavalry Division. These questions were worked out at RDF exercises of the variety "Eclaire" and "Fartelle," among others.

It is believed that the 11th Airborne Assault Division will comprise the core of the task force assigned to conduct an airborne assault operation. It can be dropped 200 km or more deep in enemy territory with the mission to seize and hold an important line or position, destroy enemy command or communications systems, break up enemy troop deployments, etc.

French and NATO military experts express the greatest interest in forms of combat employment of the 4th Air-Mobile Division and 6th Armored Cavalry Division, insofar as they are considered fundamentally new ground-force units, have a high degree of mobility and significant fire power. These experts believe the 4th Air-Mobile Division can accomplish missions most effectively at a distance of 300 meters from the concentration area (basing). During the course of an offensive operation it can operate forward of the attacking forces in a zone of up to 100 km, break up planned enemy withdrawals, occupy their intermediate positions, and destroy offensive nuclear weapon systems, command and control points and rear administrative facilities. It can seize crossings and platforms for effecting swift passage of water obstacles by main force units. The prospect of reinforcing the 4th Air-Mobile Division in the accomplishment of its mission is generally not envisaged, since it has all the subunits it requires for conducting air-mobile operations.

As a rule, air-mobile groups are established during the course of divisional combat operations which move out along likely tank approaches, destroy enemy armored vehicles and take part in tactical airborne assaults to seize and hold objectives. During exercises, the 4th Air-Mobile Division destroyed up to 300 armored "enemy" targets in 48 hours of combat action. It is believed that each anti-tank helicopter is capable of destroying 4-15 tanks prior to being knocked out. The prospect of utilizing the entire division to conduct mobile operations in the enemy's operational depth is not ruled out, although French military experts believe that increasing the depth of an air-mobile operation is accompanied by increased risk of failure. Such a mode of combat employment requires that the enemy be suppressed in the division's zone of operation.

It is planned to employ the 6th Armored Cavalry Division in theater chiefly for conducting mobile operations in the enemy rear, during which it can accomplish missions of reconnaissance, seizing and destroying important objectives, denying enemy deployment of armor units, etc. Foreign experts believe the 6th Armored Cavalry Division can destroy about 250 tanks and other armored vehicles in 24 hours of combat.

The foreign press is also looking at the possibility of combined operations in the Central European theater using the 6th Armored Cavalry Division and 4th Air-Mobile Division. Two variants are being studied and developed during the course of training exercises in this regard.

The first of these envisages both divisions entering the conflict to develop the success of an offensive and conducting mobile operations in the enemy's operational depth. The so-called air-mechanized corps formed by the two divisions would have two echelons--an air (whose base would be the 4th Air-Mobile Division) and a ground (based on the 6th Division) echelon. It is believed that the relatively powerful armament of the helicopters, their high maneuverability and significant operational radius can effectively supplement the striking power of the armor units. Offensive operations of such a unit could reach a rate of 80 km/day.

The second variant is based on employment of both divisions as a powerful, highly mobile, anti-tank reserve for waging conflict with strong, mobile groups of enemy forces. The command of this grouping of forces will strive to utilize the great anti-tank capabilities of both divisions. Military experts calculate that, in the course of one day of combat operations, this grouping of forces can destroy up to 400 armored vehicles, i.e., they can practically eliminate the combat effectiveness of up to two enemy tank divisions.

Overall command and control of France's rapid deployment forces is effected by an RDF commander through his staff. His basic tasks during peacetime include the development of RDF employment plans, and the organization and conduct of operational and combat training.

When a crisis situation arises and the country's military-political leadership makes the decision to utilize these assets, the RDF commander forms an operational task force, command and control of which is accomplished through deployment of main and rear command posts in the area of operations. When necessary, a forward CP is dispatched from the main command post. This is an

air-mobile detachment swiftly deployed by air to the designated area. The main and forward CP's move in special command/staff vehicles (of the VAB armored personnel carrier variety). Task force communications are effected through a separate RDF communications regiment, as well as through other communications subunits. French military authorities plan in coming years to significantly enhance the combat capabilities of their rapid deployment forces, primarily by providing RDF units sophisticated weaponry and modern combat equipment. Thus, in order to strengthen RDF unit air defense capabilities, beginning in 1987 their armament inventory will include about 240 Mistral missile launchers. There are plans to increase anti-tank capability by providing these forces with the Apilas 112-mm anti-tank rocket launcher (2,000 launchers) with armor-piercing capability of up to 700 mm. Plans are being made to rejuvenate the helicopter force, add additional, new 155-mm TR towed cannons, ERC-90S armored reconnaissance vehicles, Haute ATGM launchers on VAB armored vehicles, etc.

Some military experts surmise that, in the interests of enhancing combat readiness, mercenaries comprise 80 percent of RDF unit strength, a factor allowing their employment in any region of possible conflict without an authorization inquiry by the French National Assembly.

It is also planned to increase the scope of RDF operational and combat preparedness measures, to include training conducted jointly with the armed forces of the NATO countries. In September 1987, for example, up to 20,000 servicemen from France's rapid deployment forces are expected to take part in a joint French-West German exercise.

9768
CSO: 1801/182

JAPAN'S GROUND FORCES

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 87 (Signed to press 3 Apr 87) pp 17-22

[Article by Colonel F. Vladin: "Japan's Ground Forces"]

[Text] Notwithstanding the provisions of Article Nine of the Japanese constitution of 1947, which proclaims Japan's obligation not to establish ground, sea or air forces, or other means of warfare, Japanese ruling circles are following a course of militarizing the country and building up the might of her armed forces, which have already existed about 40 years under the designation of "self-defense forces." They advocate a constant increase in military expenditures (which have grown tenfold over the past 20 years), the outfitting of their services with modern armament and combat equipment, the development and improvement of unit organizational structure, and enhancement of the operational and combat readiness level of their headquarters and troops.

As reported in the foreign press, the building of Japan's armed forces has been taking place through five-year programs, each of which undergoes revision three years after implementation. Implementation of the most recent five-year program (1986-1990) was begun in April 1986. About 100 billion dollars is planned for its fulfillment, a sum 1.3 times greater than for the previous program. Significant attention within the framework of the program is devoted to further improving the ground forces' combat capabilities by increasing the number of weapons and items of combat equipment, modernizing them, developing and improving unit structure, qualitatively improving command, control and communications, and increasing the intensity and scope of operational and combat readiness measures.

Among the services of Japan's armed forces, the ground forces have the greatest numerical strength. They include infantry and armor troops, rocket troops and artillery, air defense missile units, airborne troops, army aviation, engineer troops, communications troops and administrative units.

Organizational Structure of the Ground Forces. Overall operational command and control of the ground forces is exercised by a commander (who also serves as chief of staff) through his staff. The ground forces comprise five armies, other units and centrally subordinate institutions (Fig 1). Their fighting

strength includes 13 divisions (12 infantry, 1 armor), 13 separate brigades (2 combined, 1 airborne, 1 artillery, 2 Hawk guided missile, 1 helicopter, 1 communications, 5 engineer), 6 separate groups (2 artillery, 4 Hawk missile), a separate tank regiment and armored personnel carrier battalion, 5 army aviation battalions.

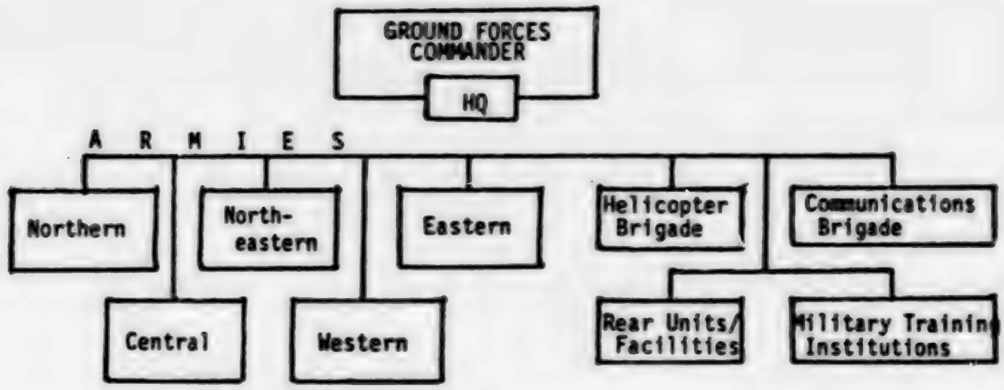

Fig 1. Organizational Structure of Japan's Ground Forces.

The army is the highest operational formation (obyedineniye) in the ground forces. It may comprise 2-3 infantry divisions, 1 armor division, 1 combined brigade, 1 airborne brigade, 1 artillery brigade (or group), 1 Hawk missile brigade (or group), 1 engineer brigade, army-subordinate units and subunits (Fig 2). The armies are named after their areas of disposition--Northern (Island of Hokkaido, headquarters in Sapporo), Northeastern (northern Honshu Island, Sendai), Eastern (eastern Honshu Island, Tokyo), Central (central Honshu Island, Itami), and Western (Kyushu Island, Kumamoto). Western military experts believe the most combat effective of these is the Northern Army, which has 3 infantry and 1 armor divisions, 1 artillery brigade, 1 Hawk brigade, 1 engineer brigade, other units and subunits.

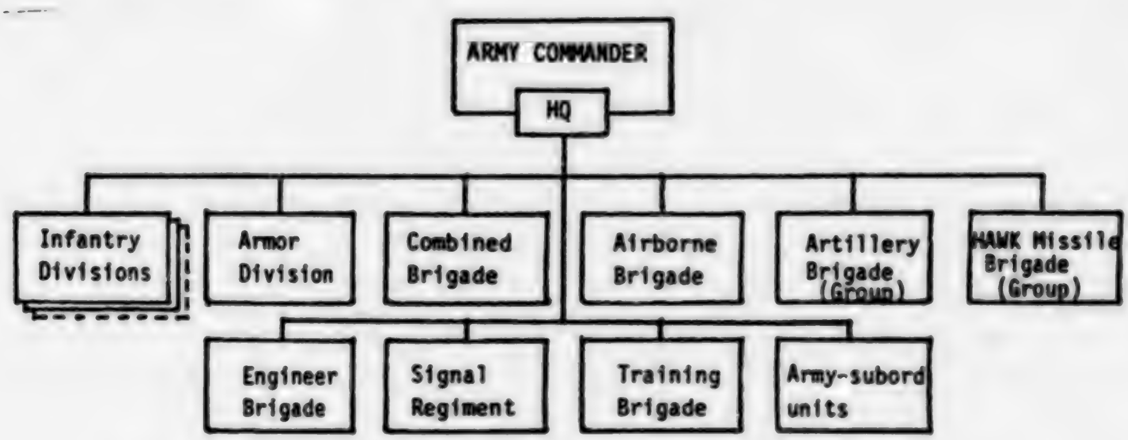

Fig 2. Organization of the Army, Japanese Ground Forces.

Japanese military authorities consider the infantry division to be the basic tactical unit of the ground forces. There are two types of infantry division today--A and B--differing in their structure, numerical strength and armament. Organizationally, the division consists of a headquarters and headquarters company, 4 infantry regiments (3 in type B), 1 each artillery, armor and engineer battalion, 1 communications battalion, and 7 separate companies--anti-tank, reconnaissance, army aviation, ordnance, supply, motor vehicle and medical. A type-A division has about 9000 men (type B--7000). Its armament consists of about 60 tanks (type "74" or "61"), 32 105-mm and 16 155-mm self-propelled or towed howitzers, 112 107- and 81-mm mortars, 16 anti-tank rocket systems of type 79 or 64 (can be jeep-mounted), 75 106-mm recoilless weapons, 14 armored personnel carriers, other weapons and combat equipment.

The armor division is the sole armor unit (soyedineniye). It was constituted in 1981 from the 1st Armor Brigade and 7th Mechanized Division and based on Hokkaido Island (Northern Army). Japanese military authorities consider it the basic striking force of the ground forces. The division consists of a headquarters and headquarters company, 7 regiments (3 armor, 1 each motorized infantry, artillery, air defense artillery and rear services), and 3 battalions (reconnaissance, engineer and communications).

The armor regiment consists of 4 tank companies, each with 18 "61" or "74" tanks (74 in all). The motorized infantry regiment has 6 motorized infantry companies and 1 mortar company. The artillery regiment has 4 155-mm self-propelled howitzer battalions (10 guns in each).

In all, the armor division has about 6,500 men, 230 tanks, about 350 "60" and "73" armored personnel carriers, 40 self-propelled howitzers, 48 mortars (81-mm and larger), 12 106-mm recoilless weapons, 40 35- and 40-mm self-propelled air defense systems, and other armament.

Japan's ground forces command believes the armor division may be used to reinforce infantry units or operate independently. In certain situations its units and subunits may be used to cover open flanks and boundaries between units, as well as other missions.

The combined brigades are units which have regiments and subunits of the basic combat branches, and are designated for the accomplishment of independent missions. They belong to the Central and Western armies, and are located today on the islands of Okinawa and Shikoku.

The airborne brigade is part of the Eastern Army and has the mission of conducting combat operations in the enemy rear. Its armament includes mortars, anti-tank artillery, other weapons and combat equipment.

The artillery brigade belongs to the Northern Army group of forces. It comprises 2 artillery groups whose armament consists of type-30 tactical free-flight rockets, 203.2-, 155- and 105-mm self-propelled and towed howitzers, 155-mm cannons, and 130-mm salvo-fire rocket systems.

The Hawk brigades (1 each in the Northern and Western armies) provide air defense cover for important military installations and facilities.

The helicopter brigade is directly subordinate to the ground forces commander. Judging from foreign press reports, it is intended to air-drop troops and loads into areas of combat operations, drop tactical assault landing forces, conduct reconnaissance and execute other missions. Its armament includes KV-107 airborne assault helicopters, reconnaissance helicopters (OH-6D and J "Cayus"), and light aircraft (LR-1 and TL-1).

The organization of the remaining separate units and subunits which comprise Japan's ground forces is similar in structure, armament and equipment to those already discussed.

As reported in the foreign press, the ground forces number 180,000 men, about 1100 tanks (approximately 600 "74", the remainder "61"), about 600 armored personnel carriers (up to 450 "60", the remainder "73"), 950 field artillery cannon, over 1800 mortars, 50 "30" self-propelled free-flight rocket systems, over 2000 recoilless weapons, about 300 "64" and "79" ATGM systems, more than 400 air defense systems (including 35 Stinger and 200 Hawk), grenade launchers, other weapons and combat equipment. Army aviation has about 400 helicopters, including 16 AH-1S of the anti-tank variety with TOW missile (with the Northern Army army aviation battalion) and 140 multi-purpose UH-1B and H "Hueys," 60 KV-107 airborne assault helicopters, 150 reconnaissance (OH-6D and J "Cayus") helicopters, and more than 30 light communications and reconnaissance aircraft.

The command of Japan's "self-defense forces" is exerting great efforts to further build up the fire power and strike capability of the ground forces, and is in effect carrying out the military-political leadership's policy of escalating militarization of the country. We see from foreign press reports that the process of outfitting units with modern weapons and combat equipment will continue. 1987 plans call for the order of about 60 "74" tanks, more than 20 "73" armored personnel carriers, over 50 field artillery cannon (including 45 155-mm towed and 6 203.2-mm self-propelled howitzers), 20 "79" ATGM systems, about 40 Stinger systems, 8 AH-1S Cobra-TOW helicopters and other armament. Foreign military experts believe these measures will facilitate more effective employment of the ground forces.

Combat Employment. The basic means of working out practical matters of unit training and the conduct of combat operations are command-post exercises, integrated combined-arms exercises, and specialized tactical drills and exercises conducted both independently and jointly with the United States.

According to foreign press data, Japanese military authorities consider the main type of ground-forces combat operation to be the offensive. Its chief goal is to defeat the enemy forces, seize and secure his territory and its important objectives. Two methods of transition to the offensive are envisioned, depending on the situation--from the march, and from direct contact. Difference in type of offensive is provided by the pursuit. The basic forms of offensive maneuver are the envelopment, flanking movement and penetration. The width of the zone of advance and the depth of immediate and

subsequent objectives are determined depending on assigned missions, forces and assets available, nature of the terrain, expected enemy resistance and flank security for the units. The infantry division order of battle may consist of one or two echelons, including infantry, armor, artillery and air defense artillery units and subunits. Regimental combat groups--infantry regiments reinforced by tank, artillery, engineer and other subunits--have been created in a number of exercises to work out the tactics of combat operations.

The foreign press reports that Japanese military authorities view the defense as a type of combat operation when it is necessary to win time for the purpose of creating conditions favorable for transitioning to the offensive, or to free up forces and assets at one sector of the front so as to be able to concentrate superior forces for decisive operation along the main axis. The defense may be fixed or mobile.

In the fixed defense, main forces are positioned along earlier prepared positions which they must hold fast. Reserves are utilized to increase the depth of defense, repulse an attack where the enemy has effected a penetration, or conduct a counterattack. In the mobile defense, the main forces are positioned in the second echelon with the mission of inflicting a powerful strike. The remaining forces and assets occupy first-echelon positions. Japanese military authorities believe that the basic fixed defense is a carefully organized system of fires, and the counterattack is an auxiliary means. In the mobile defense, the counterattack is considered the main means of achieving success--all other operations are aimed towards creating conditions favorable for carrying it out.

The foreign press reports that, in working out practical aspects of the conduct of combat operations during training exercises, major attention is devoted to coordination of staff operations, increased cooperation and mutual support between the infantry and various other branches, to include armor, artillery and army aviation. Special significance is attached to the conduct of night combat operations, operations in mountainous terrain, river and forest areas, and winter operations conducted in low temperatures, in deep snow cover and under poor road conditions. One of the basic tasks worked out during training exercises is the organization of anti-assault coastal defense. Significant attention has been devoted to ground preparation by engineers, establishing fire plans and other matters. All these matters are worked out independently as well as jointly with American forces located in the region. For example, joint Japan-United States ground forces exercises have been conducted beginning early in the 1980's and their scope is constantly expanding.

Ground forces personnel strength is built on a voluntary basis. Accepted for military service are males from 18 to 25 years of age who possess Japanese citizenship and at least a ninth-year high school education, who meet certain health conditions and are politically trustworthy. Since 1957, women from 18 to 22 years of age have been recruited for service in auxiliary positions. The initial term of active duty service for most recruits is two years--three, for individuals sent to units where technical training is required. Upon expiration of the initial term, service may be extended two years.

Territorial recruitment stations established in each prefecture deal with the practical questions of selecting volunteers for all services of the armed forces. There are 50 territorial recruitment stations in all. They are also involved in selecting students for military training institutions and candidates for officer and noncommissioned officer courses from among individuals who have completed civilian educational institutions. They select cadets for military academies and handle reservist records.

Training for the rank and file is accomplished in training units and subunits. Here over a 20-24 week period, new recruits undergo their initial military training (studying the rules and regulations, weapons and combat equipment; training in firing their individual weapons, hand-to-hand combat, first aid; executing marches, etc.), after which they are sent to infantry subunits. Servicemen selected for duty in other branches, where technical training is required, undergo supplementary training of 6-24 weeks in specialized courses.

The junior leadership ranks (noncommissioned officer, warrant officer) are filled from among the most well trained rank and file who express a desire to continue their service, as well as from civilian youth. Candidates undergo training at noncommissioned officer training centers and service branch institutions for 6-40 weeks (depending on the branch). Civilians spend two years in training at these institutions. Noncommissioned officers are trained at technical military institutions (four years) as well.

Primary officer training takes place at military universities (so-called "defense academies") and officer candidate institutions, which exist for all services of the armed forces. The course of instruction at the military universities is four years, after which a graduate receives the rank of noncommissioned officer 2d class, is sent to his unit, and then to an officer candidate institution. Upon completion of this institution, the individual is conferred the primary officer rank of lieutenant.

The rank of officer may also be conferred upon warrant officers who have undergone specialized training in 28-week courses, and upon civilians with higher education who have completed courses at officer candidate institutions (42 weeks).

Higher military training for the officer corps takes place at a command and staff college under a joint committee of chiefs of staff. Some officers are sent to military instructional institutions overseas for their training (mainly to the United States).

The measures being taken by Japanese military authorities to build up the combat might of their ground forces is yet another indication of Japan's active readiness to implement the adventuristic policies of the United States of America in the vast region of the Far East.

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MOTORIZED RIFLE BATTALION OF U.S. MECHANIZED (ARMOR) DIVISION

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 87 (Signed to press 3 Apr 87) pp 22-23

[Article by Lieutenant Colonel I. Aleksandrov: "The Motorized Rifle Battalion of the U.S. Mechanized (Armor) Division"]

[Text] In plans to implement the "Army-90" program directed towards modernization of the ground forces, the U.S. military leadership is devoting a great deal of attention to development of the organizational structure of its "heavy" divisions (mechanized and armor), whose mission is primarily the conduct of combat operations in the Central European theater. One of the main combat subunits of this type of unit is the motorized rifle battalion, consisting of a headquarters and six companies--headquarters company, four motorized rifle, one anti-tank.

The headquarters (22 men) executes planning tasks, organizes and directs combat operations, and accounts for personnel and all types of administrative and logistic support provided the subunits which are organic to and attached to the battalion. Its assets include two M2 Bradley armored fighting vehicles and three M577A1 command vehicles.

The headquarters company (345 men) includes a command section (6 men, 2 M577A1) and 6 platoons: reconnaissance platoon (30 men, command and control from 2 M3 armored reconnaissance vehicles, and 2 recon sections, each with 2 M3 vehicles); mortar platoon (36 men, command and control from 2 M966 vehicles, 2 mortar sections, each with 1 M577A1 command vehicle and 3 106.7-mm self-propelled mortars; communications platoon (13 men, command section, radio and wire communications sections); medical platoon (49 men, 5 M113A1 armored personnel carriers, command section, first aid station, and evacuation section with 8 M113A1 vehicles); administrative and logistics platoon (125 men, 58 vehicles, command and control from M577A1 vehicle, and 3 sections--transport, refueling and food supply); repair and maintenance platoon (86 men, command section, 8 functional sections--administrative, repair, technical maintenance, anti-tank, 4 technical maintenance for the motorized rifle companies). In all, headquarters and headquarters company has 367 men, 2 M2 Bradley armored fighting vehicles, 6 M3 armored reconnaissance vehicles, 6 106.7-mm self-propelled mortars, 22 7.62-mm M60 machine guns, 15 M113A1 armored personnel carriers, and 8 M577A1 command vehicles.

The motorized rifle company (116 men) consists of a command section and three motorized rifle platoons. The command section has 11 men (including the company commander), an M2 Bradley armored fighting vehicle and M113A1 armored personnel carrier. The motorized rifle platoon (35 men) has its command section (8 men and Bradley vehicle) and 3 motorized rifle squads, each with 9 men (squad leader, assistant squad leader, M2 operator/gunner, mechanic/driver, Dragon ATGM system operator, machine gunner, 2 automatic riflemen, and rifle grenadier) and an M2 Bradley vehicle. In all, the company has 13 M2 Bradley vehicles, 1 M113A1, 9 Dragon ATGM systems, 9 7.62-mm M60 machine guns, 18 5.56-mm M249 machine guns, 74 5.56-mm M16A1 automatic rifles, 18 40-mm M203 grenade launchers and other equipment.

The anti-tank company (65 men) includes a command section (3 men, 1 M113A1) and 3 anti-tank platoons. Each platoon has 20 men, command section (4 men, 1 M113A1), and 2 anti-tank squads, each with 2 teams (each team has 4 men and a self-propelled M901 TOW missile system). In all, the company has 12 anti-tank systems, 4 M113A1 vehicles, and other armament.

In total, according to foreign press reports, the motorized rifle battalion has 896 men (including 47 officers), 54 M2 Bradley vehicles, 6 M3 reconnaissance vehicles, 6 106.7-mm self-propelled mortars, 12 self-propelled M901 TOW systems, 23 M113A1 vehicles, 8 M577A1 vehicles, 36 Dragon ATGM, 70 7.62-mm machine guns, 42 12.7-mm machine guns, 114 vehicles, about 250 radios and other equipment.

Foreign military specialists believe the new organization of the motorized rifle battalion can increase its combat capabilities and provide it the greatest degree of independence on the battlefield, chiefly by virtus of its headquarters company, with its significant numerical strength and aggregate subunits. U.S. military publications note that the presence of four motorized rifle companies (earlier there were three) will allow the commander to simultaneously attack two objectives as opposed to one, which was the case before. It is stressed that the existing organization is one and the same for all motorized rifle battalions of the ground forces (separate battalions as well as those organic to "heavy" divisions and separate brigades).

The motorized rifle battalion wages battle, as a rule, as part of the brigade. It can operate as part of the brigade's first or second echelon, along the main or secondary axis of advance, in reserve, as combat security for the division or as part of a covering force. In certain instances the battalion is capable of executing a mission independently. In combat this would be based on the establishment of battalion tactical groups, composed of two or three motorized rifle and one or two tank companies, reconnaissance, air defense, engineer and other subunits for reinforcement, protection and

logistical support. Foreign press reports state that the motorized rifle battalion can advance on a 2-3.5 km front, in certain instances up to 5 km (increasing the interval between companies). In the defense, the battalion is assigned an area of defense that may reach 5 km along its front, 3 km in depth.

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CSO: 1801/182

AMERICAN RS30 MLRS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 87 (Signed to press 3 Apr 87) pp 23-25

[Article by Reserve Colonel M. Regentov: "The American RS30 MLRS"]

[Text] Judging from foreign press reports, the equipping of American ground forces begun in 1983 with the Multiple Launch Rocket System (MLRS) is continuing. This system will become standard for the leading member nations of the aggressive NATO alliance. Its purpose is the defeat (firing from concealed positions at ranges greater than 30 km) of armored combat vehicles, artillery batteries, masses of troops and combat equipment in the open, air defense systems, command, control and communications centers, and other area targets.

The RS30 MLRS consists of a self-propelled launcher, free-flight rockets in launcher/transporter containers, and a fire control apparatus. The artillery portion of the launcher is mounted on the track base of the U.S. Bradley M2 armored fighting vehicle and contains the following: stationary base mounted on the body chassis; rotating platform with rocking component affixed, the armored box frame of which encloses two launcher/transporter containers; loading and guidance mechanisms. Necessary launcher base rigidity for firing is provided through disengagement of the main spring suspension.

The armored compartment houses a three-man crew--launcher commander, gunner and driver-mechanic. The fire control apparatus is mounted here and includes a computer, means of navigation and topographic orientation, and control panel. All necessary information is exhibited on luminous displays on the control panel. The MLRS fire control apparatus may be augmented with automated field artillery fire control systems. Excess pressure in the compartment and a filter ventilation system protect the crew from gases created during rocket firing and from the effects of radioactive contamination of the terrain and the use of chemical weapons.

The MLRS system does not have the traditional permanent launcher guides. Loading is accomplished by placing two armed, one-time use, launcher/transporter containers into the housing of the armored box frame (rocking component). The containers comprise a set of six fiber-glass, tubular, launcher guides mounted in two rows in the box frame, which is made

of aluminum alloy. The foreign press reports that the launcher/transporter containers are loaded with rockets at the manufacturing plant and hermetically sealed, enabling preservation of the free-flight rockets for a ten-year period without servicing. Practically no pre-launch rocket preparation is required. Launcher reloading is accomplished using two autonomous loading mechanisms (with electro-mechanical drive) mounted on the box frame of the launcher over the container housing. This operation is carried out by one or two crew members using a remote control panel. With angle of elevation set to zero, the loading mechanism and a winch are used to raise the container from the ground to where it makes contact, then move it into the box frame housing.

After feeding firing data into the fire control apparatus (to include nose-cone detonator response time), launcher control is accomplished by command using electro-hydraulic actuators. Manual actuators are used if these are non-operational. Pre-launch levelling is not required since necessary corrective data are constantly being fed into the fire control apparatus. This is accomplished through a system with gyro-stabilized platform.

The free-flight rocket (258 or 310 kg in mass, depending on type of warhead, 3.96 m in length, 240 mm in diameter) includes a warhead, solid-fuel rocket motor and four-blade stabilizer protractible in flight. The following cartridge-type warheads have been built for the free-flight rocket and are undergoing further development.

The shaped-charge fragmentation warhead (159 kg in mass, 32 km maximum range) is designed to destroy personnel and combat equipment in the open, lightly-armored combat vehicles and for counterbattery bombardment. It is charged with 644 M77 shaped-charge fragmentation elements (having an armor penetrability of up to 40 mm).

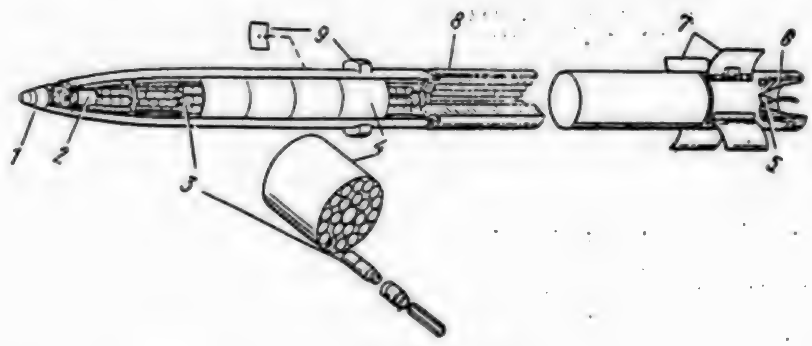

Fig 1. Free-Flight Rocket with Shaped-Charge Fragmentation Warhead.

Key:

1. Detonator
2. Assembled nose-section warhead
3. M77 fragmentation elements
4. Cylindrical polyurethane unit
5. Igniter
6. Nozzle
7. Stabilizer blades
8. Solid-fuel rocket motor
9. Oversize fittings

The fragmentation elements are densely packed inside casings of cylindrical, polyurethane cells in the thin-walled, aluminum, warhead housing (fig 1). Upon activation of the nose-cone detonator in the final segment of flight trajectory, the warhead housing is released and the shaped-charge fragments dispersed. As reported in the foreign press, 7728 such fragmentation elements are scattered in a single launcher salvo over a target area of about 25,000 square meters.

The AT-2 anti-tank warhead with mines (mass--107 kg, maximum range--40 km) was developed by West German experts. It is designed for remote mining of terrain.

This warhead is charged with West German AT-2 anti-tank, tilt-rod mines. Seven containers are positioned in the thin-walled warhead housing with four mines in each. At an altitude of approximately 1.2 km, first the containers are dispersed, then the mines are ejected from them and lowered by parachute. Immediately prior to landing, the parachute is detached. The mine hits the ground and assumes its ready-for-action orientation (shaped-charge funnel up) with the help of spring-loaded clamps. A collapsible probe is pushed out from the housing. Time of mine detonation is established prior to firing and can be from several hours to several days. According to foreign press reports, a single rocket launcher salvo creates a minefield of 336 mines and covers an area about 1000 by 400 meters. The mine's shaped charge can penetrate armor about 140 mm thick.

The anti-tank Terminally Guided Warhead (mass--107 kg, maximum range--45 km) is still in the developmental stage. It will be charged with six fragmentation elements equipped with homing head for the final segment of flight trajectory. Development of this warhead is being undertaken by a consortium of industrial firms of the United States, West Germany, Great Britain and France. Serial production is expected to begin in the first half of the 1990's.

MLRS basic specifications are as follows: launcher mass in ready-for-combat configuration--about 25 tons; length--6.9 m; width--2.97 m; height--2.6 m; maximum range--32-45 km; time of preparation to fire--2 min (from the moment of assumption of firing position); maximum speed of highway movement--65 km/hr; cruising range--500 km. Two supply vehicles with trailers are usually assigned to one launcher. These are M985 10-ton vehicles with high mobility and cross-country capability (8x8 wheel configuration). A 2.5-ton hoisting, rotating crane mounted on the body is used for loading and unloading containers. The vehicle and trailer transport four launcher/transporter containers (with six rockets each). The basic combat load of one launcher, including its 12 rockets, amounts to 108 free-flight rockets.

Judging from foreign press reports, the RS30 MLRS is already being introduced into the U.S. Army. RS30 batteries are being constituted in the divisions (one per division, nine launchers each), and battalions in the army corps (three nine-launcher batteries per battalion). In all, plans are being made to purchase 490 launchers and about 400,000 rockets for the American ground forces. According to a concluded agreement, West Germany will receive 200 launchers and 85,000 rockets; Great Britain--67 and 48,000; France--55 and

32,000; Italy--20 and 6,000. Each armor and motorized rifle division of the Bundeswehr will have a rocket artillery battalion consisting of two MLRS batteries (eight launchers each).

The international consortium for RS30 MLRS production was founded in 1986 within the framework of the NATO alliance. Joining in it were industrial enterprises of the United States, West Germany, Great Britain, France and Italy. The first European MLRS prototypes are expected to be manufactured in 1988, and to enter the inventory of the ground forces of these countries beginning in 1989. Other capitalist nations have also expressed interest in this MLRS system (Greece, the Netherlands, Norway, Turkey, Pakistan, Saudi Arabia, Switzerland and Thailand).

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CSO: 1801/182

FRANCE'S MISTRAL GUIDED MISSILE SYSTEM

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 87 (Signed to press 3 Apr 87) pp 26-28

[Article by Colonel V. Viktorov: "France's Mistral Guided Missile System"]

[Text] Foreign press reports indicate that in recent years the experience of local wars and training exercises has led high army authorities of the capitalist countries, member nations of the aggressive NATO alliance in particular, to devote ever increasing attention to strengthening their field air defense capability and developing new weapons to counter aircraft engaged in low-altitude and extremely low-altitude combat missions. In order to reliably protect troops from low-flying aircraft and combat helicopters, the foreign press notes, not only are air defense missile and artillery systems necessary, capable of accomplishing air defense missions for major groups of forces, but also means for providing subunits with direct and immediate cover. The latter includes primarily portable, air defense missile systems, which are entering the ground forces inventories of the capitalist nations today in great quantities.

One such portable missile system which holds promise, according to the opinion of foreign experts, is the French Mistral system, under development since 1980 by the Matra industrial firm. Inadequacies in similar missile systems of other countries (Redeye, Blowpipe, Stinger, RBS-70) were taken into account in designing it, as were the increased requirements of modern, high-mobility combat. Matra states that the Mistral is capable of destroying aircraft flying at a speed of 1500 km/hr at altitudes up to 3000 m and ranges from 0.5 to 6 km. The firm also emphasizes that they have increased target kill probability, and lowered system response time and cost. The foreign press reports that several variants of this missile system have been developed--portable, vehicle-transportable, air- and sea-based. All of these have a single, standardized missile and guidance system. French military authorities plan to order about 1000 systems and 10,000 guided missiles.

The basic component of the portable Mistral is the air defense guided missile, stored in its hermetically sealed launcher/transporter container. The mass of the missile is 17 kg, diameter--90 mm, length--1.8 m. It consists of a body, infrared homing head, electronic guidance apparatus, electric servomotors for

rudder control, thermo-chemical battery, detonator, warhead, sustainer motor, launch motor (capable of being jettisoned), and self-destruction mechanism.

The missile (fig 1) has a "duck" aerodynamic scheme, which provides high maneuver capabilities, the ability to withstand a force of 8 G's and obtain a rather high degree of guidance accuracy over the final segment of the flight trajectory.

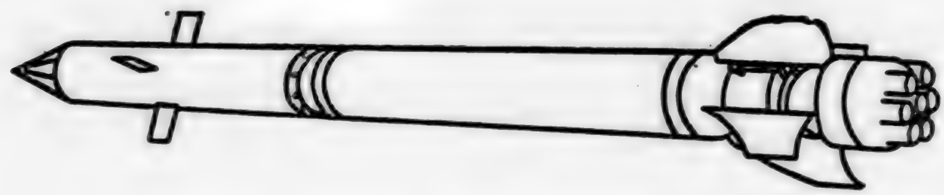

Fig 1. Mistral Guided Missile System.

The infrared homing head is located inside a pyramidal cone. This shape has the advantage over the usual spherical type in that it lowers frontal resistance. French experts believe this increases average missile velocity, lowers velocity more slowly at the end of active flight trajectory and increases maneuverability during final guidance. The homing head uses an intake unit of the mosaic type made of indium arsenide (lambda = 3-5 micrometers), which significantly increases the ability to detect and lock on targets having diminished infrared emanation and enables discrimination between desired and spurious (the sun, brightly illuminated clouds, infrared decoys, etc.) signals. As noted in the foreign press, use of a mosaic (multi-element) intake unit in combination with an appropriate system for digitally processing the signal provides sufficiently reliable protection against all known infrared decoys and significantly enhances homing-head sensitivity. In addition, the intake unit is cooled (a cylinder with cooling agent is affixed to the launch mechanism) to attain high sensitivity.

The homing head is capable of acquiring and tracking infrared signals from jet aircraft at distances over 6 km, and from light helicopters with equipment designed to reduce infrared emanation at distances over 4 km, even with oncoming headings.

The fragmentary, high-explosive missile warhead (mass—3 kg) contains finished tungsten spheroidal destructive elements. It is equipped with a contact and non-contact laser detonator. The latter (with a mechanism for precision distance reading), according to its developers, prevents premature explosion of the warhead due to interference and radiation from terrain objects, trees, etc. Range error is calculated to be about one meter. Warhead explosion at this distance from airborne targets during test-range firing has resulted in target destruction.

Requirements for an engine smaller in mass and dimensions, for a shortened operational sequence and for insuring necessary reliability have made it necessary for developers to depart from traditional missile engine design in

favor of a more complex version, particularly as regards the use of composite materials. The Mistral engine system (fig 2) has two engines—a launch engine and sustainer. The launch engine is located in the nozzle portion of the sustainer engine. When the missile is travelling in its container, the launch engine imparts to it an initial velocity of 40 m/sec. This engine has several nozzles, which effect missile rotation (10 rev/sec) for stabilization during flight. The aerodynamic rudders and stabilizer surfaces deploy when the missile leaves the launch container.

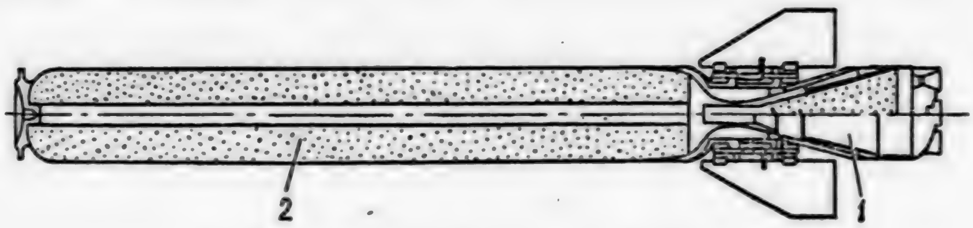

Fig 2. Mistral Propulsion System.

Key:

1. Launch engine
2. Sustainer engine

The launch engine is separated at a safe distance from the operator (15 m), at which time the sustainer engine cuts in to impart a maximum missile velocity of Mach 2.6. Such a high velocity allows the missile to reach a helicopter hovering at a distance four kilometers from the launch site in six seconds. This not only denies the helicopter the opportunity to employ its armament, but prevents its seeking concealment in natural terrain features as well.

For operator convenience in aiming and launching the missile, the launcher/transporter container and all necessary equipment is mounted on a tripod with seat affixed. Appropriate mechanisms are used to unfold the equipment and obtain the required angle of elevation for firing in practically any direction. For transportation purposes the Mistral is separated into two parts (each weighing about 20 kg)—the container with missile and the tripod with its aiming devices and electronics unit.

In developing the Mistral missile, special attention was devoted to reducing the time required for set-up and reloading. Experimental test data indicates that mounting the launcher/transporter container on its tripod and bringing the unit to combat-ready status takes about one minute. Activating the gyroscope and cooling the infrared sensor requires two seconds. Average response time (from initiation of launch sequence to missile launch) is about five seconds in the absence of external target-designation data, three seconds whan such data is on hand. Reloading requires about 30 seconds.

The aiming device consists of a collimator and telescopic sight. Collimator readings enable the operator to incorporate vertical and horizontal lead angles. Plans are being made for equipping the portable Mistral guided

missile with "Identification--Friend or Foe" instrumentation and infrared imaging apparatus for night firing.

The launch mechanism includes the following components: storage battery for powering the electrical circuits, cylinder with cooling agent, commutation device to insure required sequence of commands and signals, indicator with acoustic and vibration device which activates upon target signal lock by the missile's homing head.

Foreign press reports indicate that test-range firings of the portable Mistral were conducted from the end of 1983 through 1986. It is planned that the missile will begin being issued to France's ground forces this year. In the interest of providing air defense protection to armor and mechanized units and subunits--primarily against ATGM-equipped combat helicopters--a self-propelled variant of the missile has been developed based on the VAB armored personnel carrier (4x4 wheel configuration). Two launchers (with three missiles each) and acquisition and tracking radars are mounted on a rotating turret. An additional six missiles are stowed in their containers in the body of the vehicle. About 100 such self-propelled systems and 2500 missiles are programmed for France's ground forces. Development of a helicopter version of the Mistral, an air-to-air weapon, is presently being completed. This would be employed primarily to counter enemy combat helicopters.

A ship-mounted variant of the Mistral system, known as "Sadral," is intended for employment aboard cutters and ships up to and including frigate. It consists of a stabilized launcher and six missiles, and is additionally outfitted with infrared and television equipment for acquiring and tracking air targets.

9768
CSO: 1801/182

UNITED STATES AIR FORCE TACTICAL AIR COMMAND

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 87 (Signed to press 3 Apr 87) pp 29-36

[Article by Colonel V. Grebeshkov: "The United States Air Force Tactical Air Command"]

[Text] Tactical aviation is relegated an important position in U.S. military preparations, as it is the most flexible element of general-purpose forces, and has great mobility and the capability of carrying out a wide variety of missions both independently and in joint operations with other services of the armed forces.

The tactical air forces of the regular United States Air Force are divided organizationally into four commands--the Tactical Air Command (TAC), U.S. Air Forces Europe, Pacific Air Forces and the Alaskan Air Command. A significant portion of U.S. tactical air assets belongs to the organizational USAF reserve (Air National Guard and Air Force Reserve).

This article will present the combat organization and composition, descriptive features and prospects for TAC development, as reported by foreign press sources.

The Tactical Air Command (headquarters at Langley AFB, Virginia) is one of the basic U.S. Air Force commands. Combat-ready tactical air assets are organized and equipped with all the necessities, and undergo comprehensive training within the framework of this major USAF operational command.

TAC has about 114,000 men and almost 2400 aircraft of various designations. An additional 71,000 men and 1600 National Guard and Reserve aircraft are transferred to TAC not later than 48 hours after declaration of mobilization.

According to the view of Pentagon leaders, TAC personnel and assets, with their attached USAF reserve units, comprise a mobile, strategic reserve with the mission of reinforcing existing air force groups or creating new ones in any region of the world, and of carrying out combat operations both independently and jointly with other services of the U.S. Armed Forces and its allies. A portion of TAC assets is allocated to air defense missions in defense of the North American continent.

TAC Organization and Composition. The Tactical Air Command is comprised of three numbered air forces (1st, 9th and 12th Air Force), the operational USAF units; two divisions (28th and Southern), directly subordinate to TAC; and two training centers (tactical air combat employment and tactical fighter weapons). TAC is headed by a commanding general (currently General Robert Ross) who, through his staff, directs all activities of the command and the formations and institutions it encompasses (fig 1).

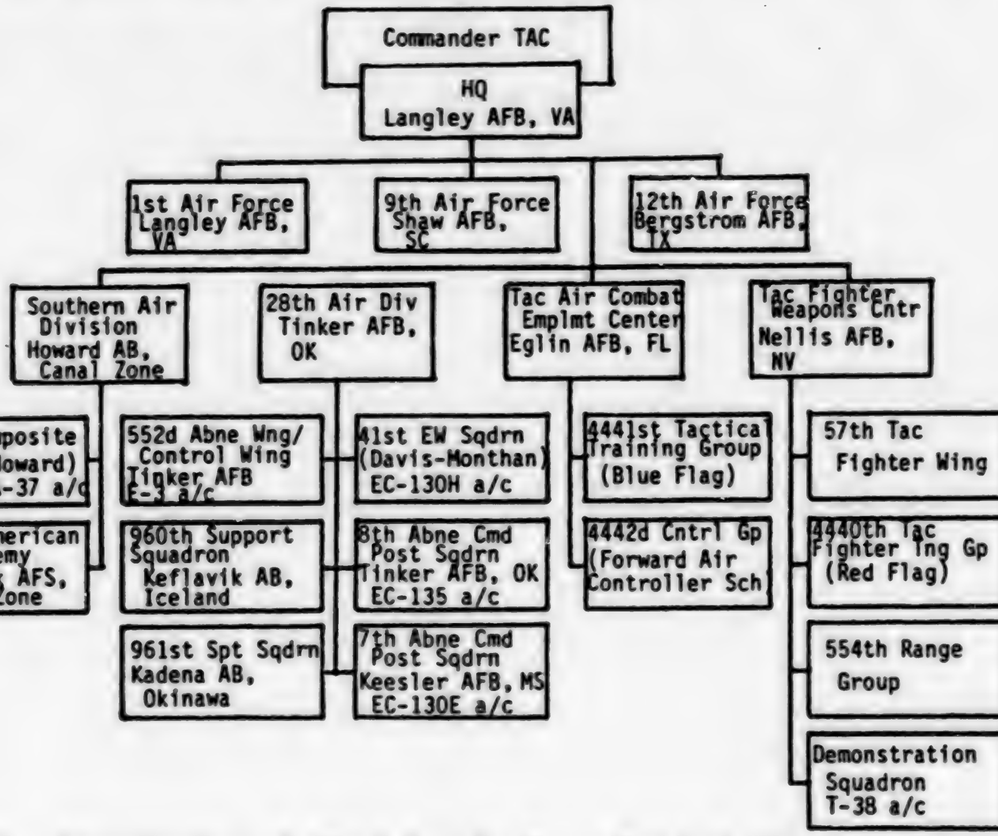

Fig 1. Organization of the U.S. Air Force Tactical Air Command.

The staff develops plans for operational employment of subordinate tactical aviation units and assets transferred from the USAF reserve, directs their operational and combat training, prepares personnel for service with tactical aviation groups stationed outside the United States, and organizes crew retraining on new aircraft.

The TAC staff is tasked with such matters as developing forms and methods of tactical air combat employment and employment of prospective weapons systems, determining the form and content of ground forces and naval support, directing tactical aviation, and writing and publishing rules and regulations on these issues.

The 1st Air Force (headquarters at Langley AFB, Virginia) was established in 1986 based on USAF air defense assets organizationally belonging to TAC. By special-purpose designation these assets comprise part of the U.S.

strategic defensive forces. Organizationally, the 1st Air Force consists of four air divisions, Icelandic Air Defense Zone Forces, the 4700th Air Defense Squadron, and the air defense testing and training center (fig 2).

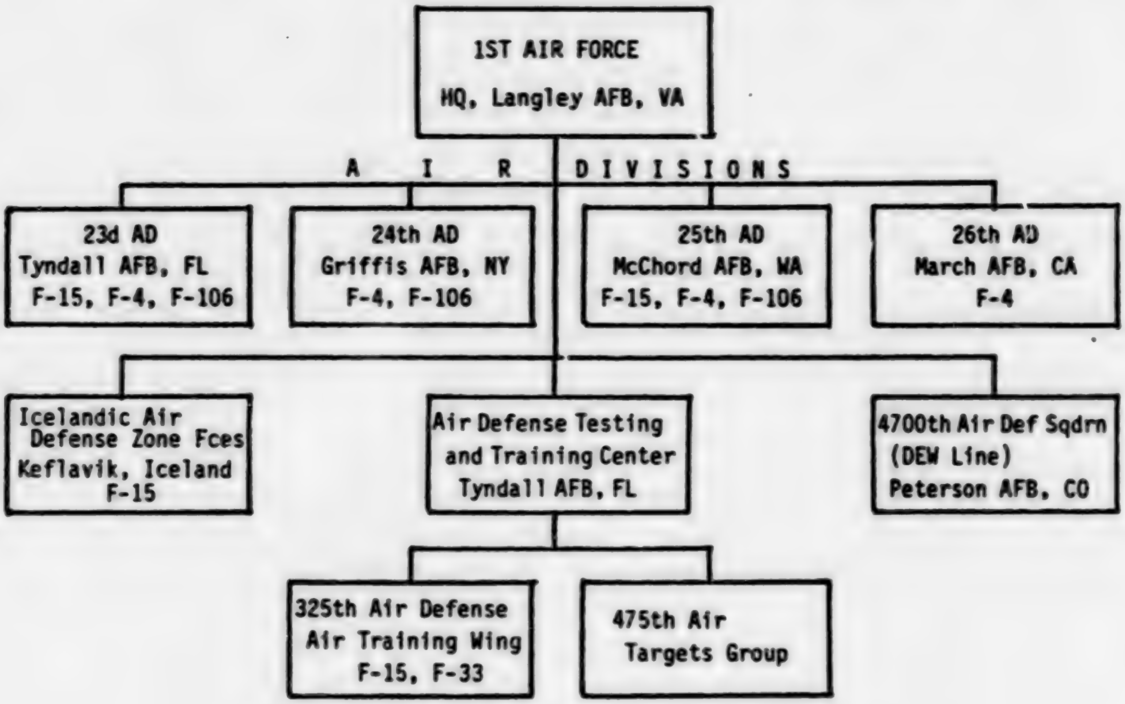

Fig 2. Organization of the 1st Air Force.

The air divisions include separate fighter-interceptor squadrons (with F-106, F-4C and D, F-15 aircraft) with radar. These squadrons comprise the principal fighter assets of the U.S.-Canada command for air and space defense of the North American continent (NORAD). They may be reinforced with fighter squadrons from the national guard contingent.

The Icelandic Air Defense Zone has one squadron of F-15 fighter-interceptor aircraft with logistic support.

The 4700th Air Defense Squadron encompasses long-range radar warning assets (DEW line).

The air defense testing and training center includes the 325th Air Training Wing and the 475th Air Targets Group. Its mission is to train fighter-interceptor crews and officers operating command and control facilities on the ground, to develop views with respect to the role and importance of air defense assets in strategic defense of the North American continent, and to develop forms and methods of tactical operations for fighter-interceptors. The air targets group provides the combat training for all air force units based in the continental United States.

The 9th Air Force (Shaw AFB, South Carolina) is comprised of 10 air wings (each at its own air force base)--8 tactical fighter wings, 1 training wing and 1 tactical air control wing. The 9th Air Force is organized as shown in fig 3.

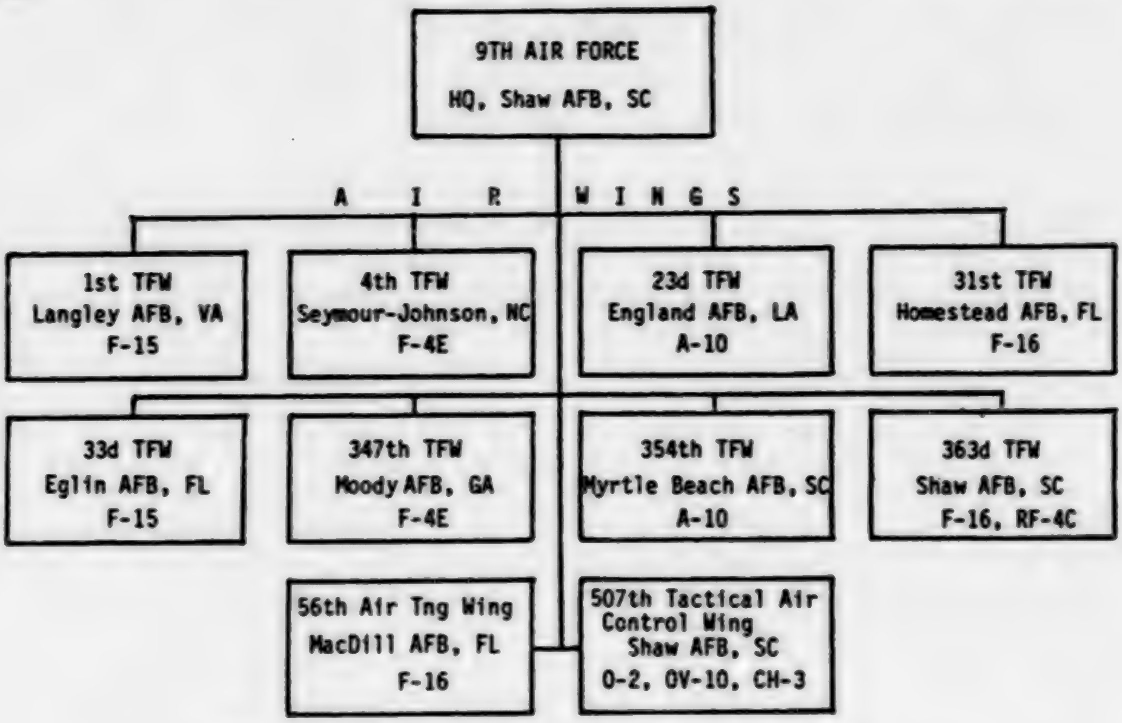

Fig 3. Organization of the 9th Air Force.

The tactical fighter wing includes three or four squadrons equipped with a single type of aircraft (F-4, F-15, F-16 or A-10; 24 aircraft per squadron). An exception is the 363d Tactical Fighter Wing, which has, in addition to F-16 tactical fighter squadrons, a reconnaissance squadron equipped with RF-4C aircraft.

The 12th Air Force (Bergstrom AFB, Texas) differs structurally from the 9th AF by virtue of its basing peculiarities. It has 13 air wings in all (6 tactical fighter, 1 tactical reconnaissance, 5 training and 1 tactical air control), located at nine air force bases. Division headquarters (for the 831st, 832d, 833d and 836th air divisions) are stationed at four of these bases, which locate two wings each. The division headquarters have purely administrative functions, and therefore are not involved in matters of tactical air combat employment. Two air wings are armed with the F-111 heavy tactical fighter, two with the light F-16, one with the F-15 fighter and one with various modifications of the F-4 tactical fighter, including the F-4G "Wild Weasel," specially built for detection and destruction of air defense missile complexes. In addition to F-111 aircraft, the 366th Tactical Fighter Wing includes the recently constituted electronic warfare (EW) squadron, which employs EF-111A EW aircraft.

The 67th Tactical Reconnaissance Wing includes one combat squadron (18 aircraft) and several training squadrons. It employs RF-4C aircraft.

The 868th Tactical Missile Training Group, formed at Davis-Monthan AFB, Arizona as part of the 836th Air Division, supports the center located there for ground-launched cruise missile training of personnel for the missile units deployed in a number of West European countries under USAFE. The 12th Air Force is organized as shown in fig 4.

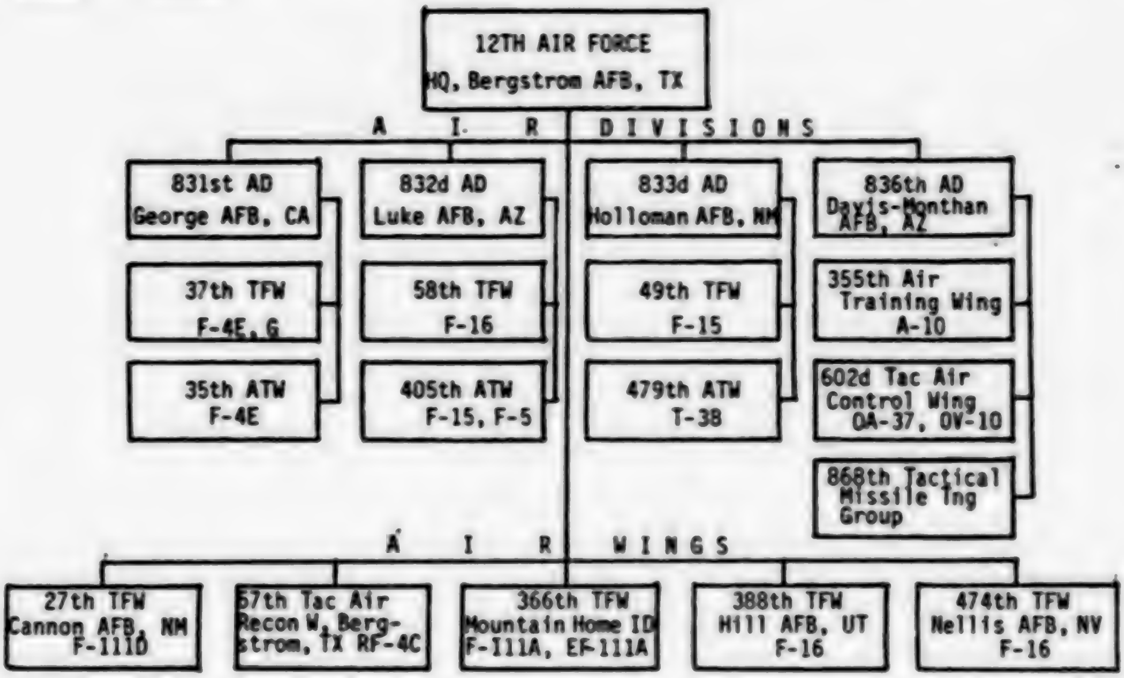

Fig 4. Organization of the 12th Air Force.

The air wings which comprise the 9th and 12th Air Force train for general tactical air missions, namely: achieving air superiority, providing direct air support to ground forces, isolating a combat operations area, and conducting air reconnaissance.

TAC's tactical air control wings are assigned the mission of deploying ground-based command and control facilities to the theater of combat operations. Crews of air navigation control aircraft (O-2, OV-10, OA-37) squadrons act as forward air controllers.

The 28th Air Division (headquarters at Tinker AFB, Oklahoma) includes the 552d Airborne Early Warning and Control (AWACS) Wing , two (960th and 961st) support squadrons, two (7th and 8th) airborne command post squadrons, and one (41st) EW squadron.

The 552d Wing has three combat squadrons of E-3 early warning and control aircraft (963d, 964th and 965th) and one training squadron (966th). The wing has 34 aircraft in all, some of which are permanently stationed among USAF

forward groups of forces and are replaced periodically according to an "interchange" program. The wing's basic missions are to support combat operations of air forces in various operational theaters and to control tactical fighter combat operations. Foreign press reports note that within the armed forces command and control system for a theater of operations, the E-3 aircraft can accomplish the role of airborne command post, direct air support center for the ground forces, or detection, reporting and control center. E-3 aircraft of the 552d Wing are also tasked with air defense missions on the North American continent.

The support squadrons (960th at Kadena AB, Okinawa; 961st at Keflavik AB, Iceland) have no organic E-3 aircraft. However, from two to four such aircraft are constantly available to them, systematically accomplishing operational air watch and fulfilling USAF operational and combat training missions.

The airborne command post squadrons (7th and 8th) employ EC-130E and EC-135 aircraft, the former being used for effecting tactical air control in a theater of operations, the latter--chiefly for in-flight refuelling in support of extended, non-stop flights of tactical air sub-elements.

The 41st Electronic Warfare Squadron employs EC-130H "Compass Call" aircraft, assigned the mission of effecting jamming and interference of enemy air command and control nets.

The Southern Air Division is stationed in the Panama Canal Zone. It consists of the 24th Composite Air Wing (Howard AFB; O-2 and OA-37 aircraft) and the Inter-American Air Force Academy (Albrook AFS). The division headquarters is assigned the mission of directing U.S. military missions in the Latin American states and training specialists for these countries.

The Tactical Air Combat Employment Center (Eglin AFB, Florida) is directly subordinate to TAC Headquarters and includes the 4441st Tactical Training Group ("Blue Flag") and the 4442d Control Group (school for forward air controllers). The center's missions include: research and development of forms and methods of combat employment of the EW assets available to tactical aviation and support units; generalization of air combat operations experience and the results of operational and combat training with regard to matters of employment of command and control facilities, communications, reconnaissance and EW assets; conduct of personnel training and readiness evaluations in these areas. Additionally, the center conducts testing and evaluation of new varieties of air-to-air and air-to-ground weapons systems, flight trainers and reconnaissance systems.

The Tactical Fighter Weapons Center (Nellis AFB, Nevada) includes the specially equipped Nellis Test Range, the 4440th Tactical Fighter Training Group ("Red Flag"), the 57th Air Wing for tactical fighter combat employment, and their aircraft (F-15, F-16, F-111 and A-10 sub-elements; F-5E fighter squadrons acting the role of enemy aircraft). The center also includes USAF demonstration squadrons with T-38 aircraft.

The primary mission of the center is the development of recommendations for improving the state of combat readiness of TAC units and increasing that level of combat readiness. In this regard center personnel engage in the following: study and analysis of questions involving employment of tactical fighters and their armament; development of new methods of combat employment and tactical operations; testing of weapons systems undergoing development and seeking ways to improve the effectiveness of existing such systems; direction of the activities of TAC tactical fighter weapons schools; study of the capabilities of general-designation forces both with regard to TAC programs and joint activities with ground forces headquarters; compilation of rules and regulations for tactical fighter combat training and weapons employment; liaison with other commands on matters related to the development and improvement of tactics in the conduct of combat operations under various conditions.

The Tactical Air Command actively cooperates with the other major USAF commands. During the course of organizing the activities of TAC units, particularly when they are deployed to regions overseas, liaison is effected with the Strategic Air Command (providing air-refuelling aircraft) and the Military Airlift Command (providing air transport for airlifting personnel, materiel and technical maintenance units, meteorological support, search and rescue). TAC works together with the Air Force Systems Command in the development of new armament and combat technology, with the Air Force Logistics Command in providing units and subunits with all necessary supplies and provisions, and with the Air Training Command in questions of training for TAC flight and technical maintenance personnel. TAC works closely with the USAF Communications Service in all matters concerning the organization of command, control and communications, and with the Electronic Warfare and Security Command in matters of electronic warfare.

The structure of the Tactical Air Command shown above comprises part of the USAF administrative organization, and within this framework the TAC commander is subordinate to the USAF Chief of Staff. However, combat employment of TAC assets, like those of the other major USAF commands, is accomplished within the framework of an operational organization of U.S. forces, comprising a system of unified and specified commands tied in to a committee of the chiefs of staff, Secretary of Defense and U.S. President.

TAC allocates its assets within the operational organization framework of the U.S. Armed Forces, and is the USAF component of the following four unified commands: Readiness Command, LANTCOM (Atlantic Command; the TAC commander also serves as the commander of USAF components), Central and South American Command (the Southern Division Commander commands the USAF component) and the Unified Central Command (the 9th Air Force Commander commands the USAF component). In addition, TAC allocates assets (from the 1st Air Force) to the joint U.S.-Canadian command for air and space defense of the North American continent (NORAD).

The composition and missions of tactical fighter and air reconnaissance assets, command and control facilities, and reconnaissance and electronic warfare assets allocated by TAC to each of the above-listed unified commands are laid out in operational plans which are continually revised and updated,

and whose provisions are tested and verified during the course of training exercises conducted in the unified commands.

Future of the Tactical Air Command. The most extensive modernization of the U.S. tactical air fleet since World War II is now taking place (begun in 1975 and projected to extend through the 1990's). A-10 ground-attack aircraft have entered the air force inventory; all-weather F-15 tactical fighters and F-16 light tactical fighters continue being added to the inventory. About 3000 such aircraft are programmed for entry into the tactical air inventory. A significant portion of these will be assigned to TAC and the USAF regional commands. At the same time, some A-10, F-16 and F-15 aircraft are allocated to USAF reserve components. Plans exist for equipping the air force with new-generation ATF tactical fighters beginning in the middle of the 1990's.

In order to accomplished assigned missions, measures are being conducted in the United States to develop and improve tactical aviation armament; command, control and communications systems; and target detection, designation reconnaissance and EW systems. There is large-scale purchase and procurement of precision weapons systems for aviation units--air-to-ground (Maverick missiles, HARM, GBU-15 "smart" bombs, bomb clusters) and air-to-air (AMRAAM guided missile systems, Sparrow, Sidewinder) systems. Measures are being taken to enhance aircraft capabilities for all-weather, day or night operations.

To this end TAC is developing new tactical aviation requirements and concepts for its combat employment as well as procedures for combat operations both independently and in conjunction with other services of the armed forces.

In accomplishing the above-mentioned measures, the American military leadership strives to insure a high degree of combat readiness in tactical aviation under today's conditions and with a view to the future. This presupposes the conduct of operational and combat readiness training under conditions which simulate combat conditions to the maximum possible extent, and entails the achievement of a high degree of mobility and the capability for swift deployment to any region on the globe.

In this regard, TAC units are constantly engaged in joint exercises conducted by the U.S. Armed Forces and those of her allies, and conduct training with respect to airlifting U.S. units from continental United States to overseas theaters of combat operations.

In accordance with the concept of "dual basing," TAC units participate in annual exercises--"Crested Cape," "Creek Bee," among others--during which U.S. aircraft are actually transferred to forward bases in West Germany and other NATO countries with in-flight refuelling (10-15 such exercises are conducted annually in which over 200 aircraft take part). This kind of aircraft transfer also takes place in the Pacific region and other areas of the world. Exercises are conducted within the framework of the "Checkered Flag" program, which provides TAC crew training for operations conducted from airfields overseas. In accordance with this program, certain air bases are operationally designated for each TAC squadron.

Specifically, 53 of 77 joint-use air bases in the European NATO countries used by the U.S. Air Force are allotted to TAC reinforcement elements. Flight crews and ground-based tactical air control agencies make detailed studies of military operations from designated forward air bases, systematically participate in training exercises involving re-basing to these airfields and conduct combat training exercises from them.

In developing plans for reinforcing air forces overseas, special attention is also being devoted to training tactical aviation units and elements in the use of open airfields available there. To this end, sets of spare parts and other maintenance and logistic support are pre-positioned in addition to the necessary airfield equipment. The latter is stored in special containers capable of being loaded into military transport aircraft, delivered to the desired airfield and quickly set up.

Foreign press reports note that the U.S. Air Force is devoting a great deal of attention to increasing the number of combat sorties, especially with respect to tactical aviation. This is achieved by decreasing the volume of technical servicing accomplished for additional sorties, reserve crews, etc.

In conducting operational and combat training, a great deal of attention is devoted to measures which approximate a combat environment to the greatest possible extent. The various "flag" exercises are important in accomplishing this. "Red Flag" exercises, for example, are conducted 8-10 times per year at a specially-equipped Nellis AFB training area of the tactical fighter weapons center. Up to 1400 targets of various types are employed at 40 prepared areas of this test range, 315x185 km in area, simulating battlefield conditions. Test-range facilities provide up to 400 aircraft sorties daily.

"Red Flag" exercises involve the staff, units and sub-elements of TAC, SAC and other USAF commands, naval and marine aviation, and the air forces of U.S. allies. The training environment approximates that of combat to the maximum possible degree. Aviation elementss accomplish their missions under conditions of severe "enemy" air defense counteraction, including air defense missile systems, artillery and fighter-interceptors. The specially formed 63d and 64th squadrons use F-5E aircraft in playing the role of "enemy" in exercise air battles.

"Blue Flag" exercises are devoted to working out matters of tactical aviation command and control in a theater of operations under conditions which approximate existing ones to the greatest possible extent. These are conducted four times per year in an area of the Eglin AFB test range, using aircraft and armament of the tactical air combat employment center located there. These exercises involve personnel from U.S. Air Force and ground forces headquarters, command posts and command and control centers.

Air force assets taking part in these exercises include squadrons of tactical fighters, reconnaissance aircraft, ground-attack aircraft, EW and early warning and control aircraft (E-3A, EC-130E, EC-135). TAC headquarters or that of the 9th or 12th Air Force exercises direction and control of the aviation units and elements. The exercises develop air force operations designed to penetrate a well-prepared enemy defense and overcome a strong air

defense system under conditions of widespread electronic warfare employment by both sides. The concept of the exercise is developed in conformance with actual conditions in the European theater of operations, on the Korean Peninsula, or in the region of Southwest Asia.

The exercise "Green Flag," also known as "Electronic Red Flag," is conducted under the auspices of the tactical fighter weapons center. Basic attention is devoted here to questions concerning tactical air combat operations under conditions of a strong enemy air defense system and widespread use by both sides of electronic warfare measures, to conducting evaluation of new EW measures and developing the most effective means of their tactical employment. "Green Flag" is usually conducted as a tactical flight exercise using a great number of aircraft and the capabilities of the Nellis AFB test range. Thus, "Green Flag 85/5" took place over a six-week period and involved more than 1500 aircraft, completing over 5000 sorties.

Foreign military experts emphasize that the U.S. Air Force Tactical Air Command is an important integral part of American general-purpose forces. TAC is accomplishing measures to effect a radical, qualitative renewal of the tactical aviation aircraft inventory. It is retraining its personnel on new types of aircraft, and developing the most effective methods of combat employment. TAC assets include major ready reserves of tactical fighters, reconnaissance and special-designation aircraft capable of rapid deployment to various regions of the globe.

9768
CSO: 1801/182

TORNADO MULTI-PURPOSE TACTICAL FIGHTER

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 87 (Signed to press 3 Apr 87) pp 36-40

[Article by Colonel Yu. Alekseyev, candidate of technical sciences: "The Tornado Multi-Purpose Tactical Fighter"]

[Text] The history of development of the Tornado aircraft is to some degree typical of the joint development of aviation technology by European NATO member nations. Characteristic of this process are attempts to assemble a large group of developers, lengthy arguments to obtain agreement as to overall requirements, an acute struggle to eliminate dangerous potential rivals and, of course, a noisy, propagandistic campaign in the press and other mass media as to the "necessity" of building up NATO's air power in the face of the "growing Soviet military threat."

By the middle of the 1960's, the aviation industries of the West European nations had basically recovered--not without the assistance of the United States--from the losses incurred in World War II, and NATO ringleaders had lifted many restrictions from Italy and West Germany in the sphere of military production. In addition, these countries gained the opportunity to develop a modern technological base as a result of acquiring licensed production of the American F-104 Starfighter. It is no accident, of course, that West Germany emerged as the actual developer of the Tornado aircraft at the end of 1967, proposing the "Neue Kampf Flugzeug" (new combat aircraft) project. This aircraft received the designation MRCA-75 (Multi-Role Combat Aircraft) after Great Britain, Italy, Belgium, Canada and the Netherlands joined in the project. In spring of 1969, however, Canada, Belgium and the Netherlands withdrew from participation in the development of the new fighter, and the remaining three countries formed the Panavia consortium, consisting of the British enterprise British Aerospace, the West German Messerschmitt-Bolkov-Blom, and the Italian Air-Italia. Nor did command of the NATO alliance stand idly by, declaring development of this aircraft a NATO project and forming a special organization for its management--NAMMO (NATO MRCA Management and Production Organization) with its executive agency NAMMA (NATO MRCA Management Agency). The fighter aircraft was officially given the name "Tornado" early in the 1970's.

Purpose of the Aircraft. According to foreign press reports, the Tornado was developed from the very beginning as a multi-purpose tactical fighter for fulfilling the following typical missions--conducting direct air support, isolating the area of combat operations, attacking enemy air assets on the ground, fighting to achieve air superiority, intercepting air targets, providing air defense, attacking sea targets and conducting reconnaissance. A variant of the aircraft optimized for engaging ground and sea targets was conditionally designated "Interdiction Strike (IDS)," and one designed for the air defense mission was labeled "Air Defense Variant (ADV)." The former is well known in West German and Italian military aviation as "Tornado," and in Great Britain as "Tornado-GR.1." The latter is referred to in Great Britain's air force as the "Tornado-F.2."

Original plans called for a two-seater fighter, the Panavia-200, and the single-seat Panavia-100 (for Italy); finally, however, only the two-seat variant emerged. Aircraft development ended in 1972. Nine experimental models and six pre-series production aircraft were built for flight testing begun in August 1974. Series production began in 1979. As noted in the foreign press, Tornado variants all have the same basic design and construction. They differ chiefly in on-board equipment. This article presents the features of the IDS Tornado and those characteristics which distinguish it from other variants of the aircraft.

Design. The Tornado has the normal aerodynamic design with high, variable-configuration wing and two-dimensional, side air intakes. The semi-monocoque, all-metal fuselage consists of three sections (nose, mid and tail) whose main construction materials are aluminum alloys. The air ducts leading to the engine are direct, resulting in minimal air flow distortion. Boundary layer drain is accomplished through slits in the air intake upper surfaces. Air brakes are located on the upper surface of the fuselage tail section.

The wing is made mainly of aluminum alloys; the load-bearing, outer-wing sections--of titanium alloys. The slewing portions of the outer wing panel have a maximum forward-edge sweep angle of 67 degrees, minimum--25 degrees. Wing root angles are 60 degrees. Control of wing panel slewing is hydraulic and slewing unit bearings are teflon-coated. The mechanism includes triple-section leading-edge flaps along the entire span of wing-slewing parts; dual-slotted, quadruple-section flaps (used for intermediate wingsweep angles to improve aircraft maneuverability); and spoilers (interceptors), two on the upper surface of each wing panel. There are no ailerons on the wing. The mechanism is electro-hydraulically driven.

The tail unit includes the usual fin with rudder, and fiberglass, tailplane pivot stabilizer, providing aircraft pitch and bank control (jointly with the spoilers). The control surfaces are electro-hydraulically driven. The landing gear is equipped with low-pressure pneumatic tires (20-ply for the main wheels, 12-ply for the nose), enabling the Tornado to operate from poorly prepared airfields.

Propulsion Unit and Fuel Supply System. The propulsion unit consists of two afterburner turbofan engines (RB.199-34R Mk101) with thrust reversal. A unique feature is its triple-shaft design with intermediate-pressure stage

which, in the opinion of its developers, provides optimal features for various modes of operation. As noted in the foreign press, this engine has the potential for increased thrust capability. Two modifications were developed in this regard--the Mk103 with increased thrust (the Mk101 turbofan engine can be upgraded to the Mk103), and the Mk104, with afterburner thrust 12-15 percent greater than that of the Mk103 and a digital control system. Engine regulation is hydro-mechanical with an electronic control unit. The turbofan engine is started up using a gas-turbine auxiliary propulsion unit (KHD-312). The main specifications of the RB.199-34R Mk101 and auxiliary propulsion unit are as shown in the tables.

ENGINE SPECIFICATIONS--RB.199-34R Mk101

Thrust (kgf) without afterburner	approx 4100
--with afterburner	7250
Specific fuel consumption without afterburner (kg/kg hr)	0.45
Air consumption (kg/sec)	70
Overall degree of pressure increase	23.1
Temperature of gases in front of the turbine (degrees Celsius)	1327
Degree of double flow	more than 1
Number of compressor stages--low pressure	3
--intermediate pressure	3
--high pressure	6
Number of turbine stages--low pressure	2
--intermediate pressure	2
--high pressure	1
Mass (kg) without thrust reversal system	900
--with thrust reversal system	1080
Length (m)	3.2
Diameter (m)	0.87

AUXILIARY PROPULSION UNIT SPECIFICATIONS

Dry mass, with its units (kg)	35.8
Maximum power (kW)--short-term	114
--extended	102
Air pressure of air withdrawn for aircraft requirements (kg/cm sq)	3.8
Specific fuel consumption (kg/kW hr)	0.25
Length (mm)	538
Width (mm)	357
Height (mm)	382

The fighter's fuel is stored in multi-sectioned, self-sealing tanks integrated into the fuselage, tail-fin and wing tanks. The aircraft is refueled at a single point under pressure. A retractable fuel-receiving mechanism may be located to the right of the cockpit for in-flight refueling. Fuel-supply

equipment may be stowed in containers suspended from the wing, in which case the Tornado is used as a fueling unit. Supplementary fuel tanks of up to 1500 liter capacity may be suspended from the fuselage and externally under the wing.

Crew Survival System. The aircraft is equipped with Mk10A ejection seats, allowing the aircraft to be abandoned on the ground, and in the air at speeds in excess of 1150 km/hr. The evaporation-type oxygen system carries a 10-liter supply of liquid oxygen.

Power Systems. The Tornado has two independent hydraulic systems with effective pressure of 280 kg/cm sq. Their pumps are driven by the gear-box systems of the left and right engines. They power the duplex tailplane hydraulic drives, rudder, main and forward-edge flaps, outer wing panel slewing, fuel receiver for the in-flight refueling system, and the pitch-control mechanism. In addition, the left hydraulic system powers the drives of the internal spoilers and wheel brakes; the right system powers the external spoilers, air brakes, landing gear, stabilization system drives and radar scanning system. If one of the engines fails, the pump of its hydraulic system can be connected to the drive of the other engine.

The main electrical power sources are two AC, oil-cooled generators with constant rotation frequency (115/220 V, 400 Hz, maximum power--60 kW A each). Two transformer-rectifiers are used to produce direct current at 28 V. A nickel-cadmium storage battery serves as an auxiliary source of electrical power and starts the auxiliary propulsion unit. Under emergency conditions in flight, the auxiliary propulsion unit can drive both generators; on the ground, it can power the gear-boxes of both engines. The auxiliary propulsion unit significantly decreases the aircraft's dependence on ground-based operating and equipment.

On-Board Equipment. The Tornado's on-board equipment includes a radar system with multiple modes of operation built by the U.S. firm Texas Instruments, the FIN1010 digital inertial navigation system (INS) built by the British firm Ferranti, a Doppler radar system, the Spirit-3 central digital computer with 64 k bits of memory, an aerodynamic parameters calculator, radar altimeter, laser range finder, TACAN system for radar identification and close-range navigation, warning receiver, shortwave and ultrashortwave radio facilities, radio compass. The electronic remote flight control system includes autopilot, three-channel stability enhancement sub-system, and two digital computers.

The foreign press has reported that INS provides a navigational accuracy of 1.85 km over one hour of flight and, when employed in conjunction with Doppler radar, the error is reduced to 0.46 km. As regards navigational performance, the following was achieved during test flights of the aircraft: INS error constituted 0.6 km for a four-hour flight (without radar correction), about 0.2 km (corrected); time interval accuracy over a six-hour flight was plus-or-minus two seconds (flight distance about 4500 km). Prior to flight, the necessary navigational data are entered by cartridge into a recording device located in the cockpit.

The firm British Aerospace recently developed the TERPROM correlation system of navigation for the Tornado. With a memory of 8 megabits, it can process data for an area of up to 345,000 sq m. Under development is another sophisticated variant having a 12 megabit memory and covering an area of 515,000 sq m. This variant is scheduled for demonstrational testing in 1987.

Armament. Armament built into the aircraft includes two 27-mm Mausers, each with a basic load of 180 rounds, suspended on seven external assemblies. Of these, the one centrally located under the fuselage and four under the wings are of the single-lock variety; the two positioned at the sides under the fuselage have three locks.

The type of armament suspended from the Tornado depends on which country is employing the aircraft. The following weapons may be mounted: Sidewinder, Aspid-1A, Skyflash, AIM-120 air-to-air guided missiles; Maverick, AS-30 air-to-ground guided missiles; Cormoran and Sea Eagle; AGM-88A HARM, ALARM and, in the future, SRARM anti-radar guided missiles; guided aerial bombs up to 2000 pounds, MW-1, BL.755 and JR233 cluster bombs, incendiary bombs up to 750 pounds; free-flight rockets. It has been reported that the Tornado can carry nuclear weapons as well.

Weapons employment is controlled from the cockpit, which has a radar display and two multi-functional indicators which display information in tabular and graphic form.

The main tactical and technical specifications of the Tornado-GR.1 and -F.2, as reported in the foreign press, appear in the table below.

TORNADO TACTICAL AND TECHNICAL SPECIFICATIONS

	GR.1	F.2
Crew (men)	2	2
Mass (kg)		
basic aircraft	14,090	14,500
maximum combat load	9000	8500
aircraft with no externally-suspended loads, internal fuel tanks full	20,400	-
maximum take-off	27,300	approx 28,000
Fuel supply (1)		
internal tanks	6400	approx 7300
maximum in suspended tanks	4 x 1500	4 x 2250
Flight velocity (km/hr)		
maximum at high altitudes without external suspension	Mach 2.2	Mach 2.2
maximum at low altitudes without external suspension	1480	1480
maximum at low altitudes with external suspension	1100	-
landing	215	215

TORNADO TACTICAL AND TECHNICAL SPECIFICATIONS (CONT'D)

	GR.1	F.2
Effective ceiling (m)	-	-
Time to gain altitude of 9100 m from moment of brake release during take-off (min)	2	2
Minimum altitude of flight in close-to-terrain mode (m)	40	-
Operational radius (km)		
for operations against ground targets, changing flight profile, combat load=3600 kg	1400	-
for interception of air targets at supersonic speeds/subsonic speeds	-	550/1850
Available time of flight, tanks suspended, radius up to 750 km, taking into account a fuel supply for 10 minutes of combat (hr)	-	2
Ferrying flight range (km)	approx 4000	-
Take-off and landing specifications (m)		
length of take-off run	less than 900	760
take-off distance to reach 15 m altitude	-	less than 900
take-off distance to reach 15 m altitude in ferrying mode	-	approx 1500
landing distance required (using reverse thrust)	370	370
landing distance required (without reverse thrust)	900	900
landing distance from 15 m altitude	-	approx 610
Dimensions		
length of aircraft (m)	16.72	18.08
height (m)	5.95	5.95
wing span at minimum sweep angle (m)	13.91	13.91
wing span at maximum sweep angle (m)	8.6	8.6
area of wing (sq m)	31	31
tailplane span (m)	6.8	6.8
landing gear track (m)	3.1	3.1
landing gear base (m)	6.2	6.2
Maximum rated operational G-force load	+7.5	+7.5

Other Tornado Variants. The West German firm Messerschmitt-Bolkov-Blom is developing a new variant of the aircraft for West Germany's air force to conduct electronic warfare and air reconnaissance. Called the Tornado-ECR (Electronic Combat and Reconnaissance), it differs from the basic model by virtue of its modified complement of on-board equipment. It has a central computer with memory capacity augmented to 128 k bits, digital data transmission line, autopilot with additional modes of operation, and suspended load consisting of electronic warfare equipment in containers. The reconnaissance equipment is to be positioned in the nose section of the fuselage and in suspended containers.

In addition, Great Britain has developed and is conducting flight tests of its Tornado-GR.1, with built-in infrared equipment for aerial photography and terrain mapping . Reconnaissance information is recorded using two recording devices for each camera circuit, allowing the operator to check results on two displays without interrupting the reconnaissance process. The aircraft's containerized reconnaissance apparatus includes two aerial cameras for conducting low-altitude photography, a television camera for daylight photography under conditions of low illumination, and infrared linear-sweep equipment (RS-710 by Texas Instruments).

West German experts believe the Tornado-ECR will have practically the same capabilities against ground targets as does the strike variant of the aircraft. The following may therefore be mounted on it: two anti-radar AGM-88A HARM guided missiles (under the fuselage), four Sidewinder air-to-air guided missles (on inner pylons under the wings), fuel tanks and containers with a variety of equipment (on outer pylons); two Cormoran AS-34 (under the fuselage), two HARM missiles (on inner pylons under the wings), containerized EW and infrared equipment with dipolar reflectors (outer pylons); container with reconnaissance equipment (on the central pylon under the fuselage), four HARM missiles (on side pylons under the fuselage and inner pylons under the wings), container with EW equipment, container with infrared decoys and dipolar reflectors (outer pylons under the wings); up to five 500-pound bombs in conjunction with various-purpose guided missiles.

In the future it is believed that a new guided missile for close air combat, the AIM-132, will replace the Sidewinder, and the anti-radar SRARM and ALARM missiles will be employed jointly with HARM. The Tornado-ECR is expected to enter the inventory in 1990. West German air force authorities plan to purchase about 120 of these aircraft to replace their outdated reconnaissance aircraft. In addition, the West German navy has expressed interest in acquiring the Tornado-ECR.

The Tornado-F.2 (Air Defense Variant) fighter-interceptor was developed for Great Britain's air force (replacing the outdated Lightning aircraft). Based on the Tornado-GR.1, it has up to 80 percent commonality of parts with it. The basic differences consist of a lengthened fuselage, the more powerful Mk103 engine (thrust with afterburner--7700 kgf; without afterburner--4300 kgf), and sophisticated electronic equipment. In order to mount the new Foxhunter radar system, the fuselage was extended 19 cm in front of the cockpit and the radome extended 63 cm. Another insert (54 cm) was made behind the second cockpit, providing for suspension in tandem of four Skyflash missiles and an increased fuel capacity (by more than 900 l). In addition, supplementary electronic equipment was mounted in place of the left cannon. The Tornado-F.2 is outfitted with a retractable fuel receptacle for in-flight refueling, and fuel tanks may be suspended from four of its pylons under the wings (each with capacity of up to 2250 l).

The basic differences in on-board equipment of this aircraft are as follows. It has the Foxhunter Doppler pulse radar system, operating in the 8-10 giga-Hertz range, whose detection range for low-flying air targets is greater than 185 km. A second FIN1010 inertial navigation system and data transmission apparatus conforming to specifications of the DJITIDS system were mounted.

Computer memory capacity was augmented to 128 k bits. To facilitate piloting, the F.2 aircraft is equipped with a system to prevent stalling in a spin and limit angles of attack; control lever force is decreased 30 percent (as compared to the Tornado-GR.1). Control of wing sweep is manual on the initial models of the Tornado-F.2; it is planned in the future to install an automatic control system.

The aircraft's main armament is considered to be the Skyflash missile with its radar system which, according to the foreign press, has a firing range of over 45 km and is capable of destroying low-flying targets under conditions of strong jamming/interference. A typical variation in suspended armament is the installation of four Skyflash missiles (under the fuselage) and four AIM-9L Sidewinders under the wing. Upon completion of its development, the AIM-120 missile should replace the Skyflash, and the AIM-132--the Sidewinder.

The program of development of the RB.199-34R engine envisages further increases in its thrust and efficiency. With incorporation of the more powerful Mk104 engine (thrust with afterburner--8700 kgf; without afterburner--4720 kgf), the modified aircraft was designated the Tornado-F.3 which, according to conjecture of British experts, will be able to operate from the highways. The Tornado-F.2 is scheduled to be modernized in the near future and receive the designation Tornado-F.2A. (Editor's note: It is stated in certain foreign publications that, after modernization, the Tornado-F.2 will receive the designation "F-3," as opposed to "F-2A.").

Delivery of the Tornado-F.2 to Great Britain's air force was begun in 1984; by the end of 1986, 20 such aircraft were expected to be in the field. The first squadron of Tornado-F.3 aircraft is expected to be constituted in 1987. A six-month retraining program for the Tornado-F.2 has been developed. This envisions one month of training on the ground and 40 hours in flight, of which 18 hours (15 flights) constitute basic training.

Aircraft Production. In accordance with official plans of the three countries engaged in its development, 809 aircraft are planned for construction, of which Great Britain is to receive 220 of the Interdiction Strike variety and 165 of the Air Defense Variant, FRG--324 (IDS), and Italy--100 (IDS). An additional 120 aircraft have been ordered, including 35 Tornado-ECR for the FRG. According to foreign press reports, over 550 Tornados of both types arrived at units in the field by the middle of 1986. Great Britain's average annual Tornado output is 44; FRG--42, Italy--24. It has also been reported that 48 of the IDS variety and 24 ADV aircraft were ordered by Saudi Arabia and 8 ADV by Oman.

Flight Testing. Flight tests of Tornado aircraft are continuing concurrently with production. These tests are related to the development of its new variants and its increasingly sophisticated on-board equipment and armament. As of September 1986, accumulated flying time of test pilots in all the experimental and test stages exceeded 12,000 hours; test flights in the field amounted to 220,000 hours. A special low-altitude testing program was carried out, and included approximately 100 flights with externally suspended loads at extremely low altitudes (up to 60 m) at speeds of Mach 0.9. In addition, a variety of long-distance, extended flights was conducted. For example,

Tornado-F.2 flights were accomplished from Great Britain to Cyprus with a single intermediate stop; Tornado-GR.1 flights were conducted for bombing accuracy during annual exercises of the U.S. Strategic Air Command, extending up to six hours with in-flight refueling.

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CSO: 1801/182

WEST GERMAN CLUSTER BOMB

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENOYE in Russian No 4, Apr 87 (Signed to press 3 Apr 87) pp 41-43

[Article by Colonel I. Chistyakov: "The West German Cluster Bomb"]

[Text] One feature of the arms race being conducted today by militaristic circles of the aggressive NATO bloc is qualitative development of the means of armed conflict. With respect to the air forces, this trend manifests itself both in the replacement of outdated models of aviation technology and modernization of aircraft/helicopters still in operation, and in the equipping of these aircraft with modern and sophisticated armament. According to foreign press reports, West German Air Force line units whose inventory includes the Tornado fighter-bomber are continuing to receive the MW-1 bomb cluster specially built for this aircraft. Called a "multi-purpose weapons system" by the foreign press, these bombs are expected by West German military experts to provide significantly increased accuracy and effectiveness in strikes by Tornado aircraft on ground-based area targets as compared with traditional air ammunition.

The Bundeswehr contracted for development of the MW-1 in 1977. The cluster mounting assembly and several varieties of special-purpose, small-caliber ammunition for it were to be developed by 1981. The ammunition is categorized into two groups, depending on the type of target to be destroyed. The first includes the KB-44 shaped-charge bomb, MIFF anti-tank mine, and MUSA fragmentation bomb (for strikes against armored equipment in battle formation and on the march, against command posts, missile and artillery firing positions, supply warehouses, and concentrated areas of personnel). The second group includes the STABO concrete-piercing bomb, MUSPA mine and penetrating-type ASW bomb (for destroying airstrips, taxiways, hangars and shelters for aviation equipment, other airfield construction, taxiing and parked aircraft).

This article presents data as reported in the foreign press with respect to design features and basis for combat employment of the MW-1 cluster bomb.

The cluster mount (5.3 m long, 1.32 m wide, 0.65 m high) consists of four sections, each containing 28 tubular guides 132 mm in diameter. A guide may hold the following: two STABO or ASW bombs; six MUSA or MUSPA mines, eight

MIFF mines; 42 KB-44 bombs. In addition, the center portion of each tubular guide contains a pyrotechnic mechanism which fires off ammunition from both sides of the cluster bomb. The overall mass of a loaded cluster bomb is about 4600 kg, 3400 kg of which is ammunition. Western press sources state that the bomb is loaded with various kinds of ammunition in various combinations, depending on type of target and nature of the mission. To destroy armor-protected equipment, for example, the cluster mount would be armed either with KB-44 bombs alone (over 4500 of them), or KB-44 bombs with MIFF mines. Loaded with ammunition, the cluster bomb mounts are stored in their plant packaging in warehouses located at airfields where Tornado fighter-bombers are based. They have a guaranteed shelf life of 10 years. Periodic inspections are scheduled for every five years, in which special attention is devoted to the condition of the ammunition.

The KB-44 bomb (Kleinbombe) contains a shaped charge in its forward section and a probe which extends with spring action; the base contains a retractable fin assembly and safety actuating mechanism. The mass of the KB-44 is about 0.6 kg, its body diameter--44 mm. Six bundles of seven bombs each are positioned in the tubular guide, and are shot out of the cluster bomb with a pyrotechnic device. The bombs are then disengaged from the bundles and follow a ballistic flight trajectory, achieving stabilization with the help of the tail fin assembly. The warhead is activated upon contact with an obstacle.

The MIFF (Mine Flach Flach) anti-tank mine consists of two cylindrical explosive charges with hollowed recesses in plates positioned opposite one another and housed in a steel casing. Its mass is 3.4 kg, casing diameter--132 mm. Placed between the charges are a safety actuating mechanism, self-destruction device, and sensitivity probes which react to the engine vibrations of an armored target heading towards the mine. After being fired out of the guide and falling to the surface, a snap ring on the mine casing releases a special spring device which sets the warhead in a position in which one of the charge's hollowed recesses is always directed upward. The mine is armed in this position and triggered whenever an armored vehicle passes over it. After a certain length of time the mine will self-destruct.

The MUSA (Multisplittermine mit aktivem Sensor) fragmentation mine is designed for destruction of lightly armored and unprotected targets, including personnel. This is accomplished using prefabricated fragments (steel balls) compressed between the casing and explosive charge. Mass of the MUSA is 4.5 kg, casing diameter--132 mm. After being shot out of the cluster bomb guide, the MUSA descends by parachute and assumes a combat configuration on the ground in the same manner as does the MIFF. The mine is triggered using a time fuse, which provides for almost simultaneous detonation of all MUSA mines delivered.

The MUSPA (Multisplittermine mit passivem und aktivem Sensoren) fragmentation mine differs in design from the MUSA in that it also has a seismic sensory device which reacts to moving vehicles and taxiing aircraft. The MUSPA is 134 mm long; its casing diameter--132 mm.

The STABO (Startbahnbombe) contains shaped and high-explosive charges positioned in tandem, as shown in fig 1. After being fired from the guide, the warhead descends by parachute which also acts as a stabilizer. When the bomb hits the surface of an aircraft runway, the shaped charge is triggered, penetrating the runway surface. The main high-explosive charge is then moved into the crater formed by the explosion. It detonates after a certain time delay, subjecting the airstrip to maximum damage. The mass of the bomb is 16.8 kg, length--602 mm, casing diameter—132 mm.

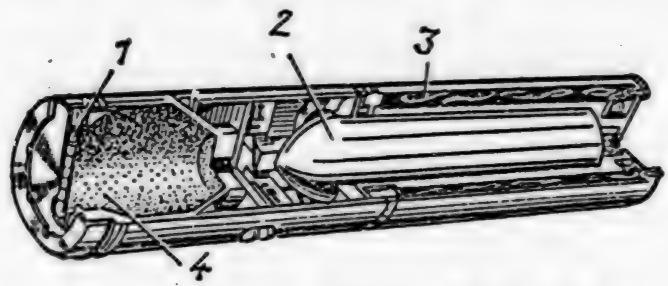

Fig 1. Concrete-Piercing STABO Bomb.

Key:

1. Detonator
2. High-Explosive Charge
3. Parachute
4. Shaped Charge

The ASW (Anti-Shelter-Waffe) bomb is intended for destruction of aircraft and aviation equipment located in concrete shelters. Similar to the STABO in its dimensions, the ASW bomb has a tail stabilizer which protracts into flight position upon separation from the cluster and a small propellant charge which is triggered after the bomb hits the surface. The latter accelerates the warhead to a speed at which the shaped charge is triggered, which then penetrates the shelter, allowing the main high-explosive fragmentation charge to destroy the equipment positioned inside.

Application of the MW-1 Cluster Bomb. The pilot in the second cockpit of the Tornado fighter-bomber controls the firing of ammunition from the cluster. He determines the aiming point and strike heading from a display indicator. For flights over an area target at altitude on the order of 30 m, the width of the strike zone may be 500 m (250 m to each side of the heading), its length--180 to 2500 m. It has been noted in the foreign press that the optimal strike zone length is entered into the aircraft's on-board computer prior to taking off on the mission, and depends on the nature of the target and type of ammunition being used (optimal strike zone length for the KB-44, for example, is 180 m). In order to provide a homogeneous field of destruction along the entire bombing length, ammunition is fired from the cluster using an intervalometer set to a certain time sequence and various speeds—100 m/sec for the forward section, 20 m/sec for the tail section. As a result, ammunition fired from the forward section falls closer to the strike zone border, and that fired from the tail section almost corresponds to the aircraft's flight path.

After all the charges are fired, the cluster sections are jettisoned sequentially, starting with the tail section (over a period not exceeding 0.9 sec). West German military experts believe leaving an empty cluster mount on board the Tornado significantly reduces its flight range for the return trip upon completion of its combat mission.

According to foreign press reports, series production of the MW-1 began in 1984. The West German Air Force intends to purchase 1400 MW-1 cluster bombs, a third of which will be loaded with ammunition for the destruction of armor-protected targets (KB-44 bombs, MIFF and MUSA mines). In addition to West Germany, Italy's air force will acquire these weapons (100 MW-1 clusters have been ordered, the first of which are expected to be delivered in 1989).

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CSO: 1801/182

IMPROVEMENTS IN AMERICAN EARLY WARNING SATELLITES

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 87 (Signed to press 3 Apr 87) p 44

[Article by Major V. Dovbishchuk: "Improvements in American Early Warning Satellites"]

[Text] An integral part of plans being made by the current U.S. administration for the militarization of near-Earth space and transfer of the arms race to outer space can be seen in the further improvements being made in existing space early warning systems and the development of new ones. According to foreign press reports, the American space early warning system is using satellites--termed Defense Support Satellites (DSP)--to detect intercontinental ballistic missile launches and register nuclear detonations. DSP's are placed into stationary orbit at points above the equatorial regions of the Atlantic, Pacific and Indian oceans. They use infrared equipment to detect ground- and sea-based missiles over their trajectory of powered flight (by virtue of flare emissions from their propulsion systems) and transmit the information to earth stations located in Australia and the continental United States.

The first of 13 DSP satellites was launched in 1971. The system has been continuously replenishing itself since that time, new satellites being launched periodically from the air force missile complex at Cape Canaveral, Florida. Foreign military experts believe that up to the middle of the 1990's the American early warning system will be developed and improved within the existing framework, with an aim towards increasing its survivability, its resistance to jamming and interference, and its reliability and detection capabilities. DSP-2 (so-called second generation) satellites were programmed for placement into orbit beginning in 1986.

Improved survivability and resistance to jamming for the new satellites is expected to be achieved through the installation of equipment to provide a satellite-to-satellite laser link and data transmission devices preventing information losses due to enemy jamming. This will reduce dependence on the earth stations situated outside U.S. territorial limits. Protection of an infrared telescope mounted on the DSP-2 from laser radiation is envisioned and, subsequently, satellite maneuver in orbit for the purpose of escaping enemy weapons. The survival of existing and future DSP's is also expected to

increase by virtue of their increased autonomy and the introduction of mobile stations for receiving information.

The satellites are expected to achieve increased functional reliability through improvements in on-board systems which use satellite data in orbit over a prolonged period. In order to enhance DSP-2 detection capabilities, it is planned to equip the satellite with a more sensitive telescope which functions through several ranges of the radiation spectrum and provides enhanced quality in object detection and identification.

It is reported also that sophisticated sensors for detecting nuclear detonations will be installed on board the new satellites. Insofar as the mounting of additional equipment will require increased power from on-board electrical energy sources, the area of the solar batteries is expected to be increased. The satellites will have increased mass and dimensions, a factor which will make greater demands of the means used to place them in stationary orbit. Thus, instead of using the earlier booster rockets of the Titan family, DSP-2's are intended to be placed into orbit using the U.S. Space Shuttle and the inter-orbital IUS towing craft.

Foreign experts link further improvements in the U.S. space early warning system to the development of a new satellite, based on the newest technology and applying the latest scientific achievements. It is believed, for example, that the use of infrared equipment with mosaic photo-detector will provide significantly improved quality in target detection. The continued improvement of DSP satellites presumes concurrent modernization of ground-based systems for receiving, processing and transmitting information to users.

The broad scope of efforts to develop and improve early warning satellites is an indicator of further intensified efforts by the United States to militarize space, and underscores the aggressive nature of U.S. space policy.

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CSO: 1801/182

ORGANIZATION OF COMMAND AND CONTROL IN THE AMPHIBIOUS ASSAULT OPERATION

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 87 (Signed to press 3 Apr 87) pp 45-52

[Article by Captain 2d Rank (Reserve) V. Mosalev: "Organization of Command and Control in the Amphibious Assault Operation"]

[Text] In raising hegemonism, aggression and adventurism to the rank of national policy, U.S. ruling circles are declaring vast regions of the globe as their zone of "vital interest." They are preparing their armed forces for expansionist wars against countries of the socialist community and movements of national liberation in other countries. Outstanding examples of this are the marauding seizure of Grenada, the bandit-like attack on Libya, the "undeclared war" against Angola, Afghanistan and Nicaragua.

The strike force of the American armed forces is the marine corps, and it is marine assets which comprise the interventionist "rapid deployment forces." One of the basic forms of marine offensive operations is the amphibious assault operation, which may be conducted by naval forces independently or in conjunction with ground and air forces. U.S. amphibious assault operations are divided into three categories, depending on their objectives and the scope and composition of participating forces--invasion, limited attack objective and raid. (Editor's note: For a more detailed description of the types, stages, composition and organization of forces in amphibious assault operations, see ZARUBEZHNOYE VOYENNOYE OBOZRENIYE, 1985, No 7, pp 59-66.)

This article examines certain questions concerning the organization, command and control of assault forces engaged in naval raid and limited objective operations during the landing phase--considered the most important and most complex.

The United States naval command emphasizes that the success of an amphibious assault operation depends to a significant degree on precise organization of the command and control system which functionally links command echelons, command and control centers, and communications systems. This system must fully conform to the composition of forces engaged in the operation, must have a high degree of reliability, continuity, operational effectiveness and secrecy, and must have the capability for rapid deployment in all geographical regions.

The main purpose of the command and control system during the landing phase is to insure coordination in the operations of all participating forces during accomplishment of their assigned missions.

In order to exercise command and control of forces in the amphibious assault operation, temporary units are formed at various levels of command based on permanent staffs and special-purpose sub-elements, which direct the combat operations of subordinate and attached units and provide mutual support to other forces participating in the operation.

The assault task force staff and its elements are constituted when planning for the operation begins, but the landing force staff is formed upon allocation of forces designated for the landing. Landing force staff personnel operate in sub-elements of the assault task force and become an independent command element only after the landing has taken place and its commander has assumed command on shore.

The basis of the command and control system for this operation is command posts in which direct control of combat operations is exercised by combat operations centers formed at the command posts of marine battalion and air wing level and higher. These centers usually include staff officers detailed from the given major unit, communications officers from subordinate, attached and supporting units, and the required communications specialists and systems.

Command and Control Elements of the Assault Task Force. The highest element of command and control in the amphibious assault operation is the command post of the assault task force commander. The command post of the landing force commander and those of the operational group commanders of ships in the covering and security forces, fire support and maintenance group CP's, etc., are subordinate to the assault task force CP. This CP includes a landing support force coordination center, joint reconnaissance center, tactical air control center, and logistics coordination center. Main task force elements which exercise control of air operations also include helicopter, air defense and tactical air direction centers deployed on ships of the main task force.

The landing support force coordination center is stationed on the main task force flagship and consists of three sections--naval artillery support, air support and target information. The first of these provides liaison between naval artillery support and other appropriate elements; the second--between aviation control elements and the air units themselves which are allocated to provide the support. The third section obtains target data using all channels of the communications center, distributes them to the support forces and issues commands of execution through the same communications channels. The center maintains communications on 17 radio nets.

The joint reconnaissance center, stationed on the main task force flagship, includes naval, marine and naval aviation reconnaissance specialists, whose functions are distributed according to subject matter of sea, ground or air reconnaissance. The center determines the overall reconnaissance tasks of the operation, collects and processes intelligence reports, maintains general reconnaissance situation maps with respect to enemy sea, ground and air assets, conducts constant analysis and evaluation of the environment, compiles

a target listing, and develops and conducts the scheduling of reconnaissance missions. The center is constituted with the beginning of reconnaissance planning, and ceases its operations upon decision of the landing force commander after he assumes operational command on shore.

The tactical air control center is the main command and control element for aviation support. It accomplishes observation, coordination and overall control of all aviation and air defense activities in the area of the operation. It is stationed on the main task force flagship, but relocates to the shore upon disembarkation of the landing force. Prior to disembarkation, the tactical air control center consists of an aviation support section and air defense section. Along with the helicopter direction center, the aviation support section directs aviation assets accomplishing offensive missions; the air defense section exercises overall direction of detection, identification, interception and destruction of enemy offensive air forces. The tactical air control center also directs air operations in defending the main assault task force from attack by enemy surface vessels and submarines.

The helicopter direction center, stationed on one of the ships with the assault helicopter group, is assigned the mission of directing the flights of all helicopters between ship and shore. It maintains communications with all air control elements, fire support and air support direction centers, helicopter-carrying ships, on-shore helicopter units, helicopter flight coordinators, helicopter control points in the landing zone, and helicopters in the air. Helicopter control points in the landing zone are subordinate to the helicopter direction center.

The air defense center functions within the tactical air control center prior to the latter's relocation on shore, and coordinates the operations of the naval air defense sector control centers subordinate to it. The center may be stationed on the main task force flagship or on an aircraft carrier and, upon deployment of the tactical air control center to shore, becomes subordinate to it and itself becomes the naval air defense sector control center.

The tactical air direction center is subordinate to the tactical air control center, and has the mission of directing all air operations in a limited area of the amphibious assault operation removed from the main landing site. It is similar in organization to the tactical air control center and may replace it for a limited period of time, e.g., during the period of relocation. Prior to the landing, the tactical air direction center is stationed on the flagship of the main task force, but transfers to shore with the landing force. Upon assumption of operational command by the landing force commander on shore, it becomes the tactical air control center on shore. The control center on the flagship performs direction center tasks and becomes subordinate to the shore-based tactical air control center.

The logistics coordination center is located on the main task force flagship and is the main planning and coordination element for logistic support of forces participating in the assault operation. It consists of logistics group staff personnel, representatives of technical maintenance groups for the amphibious and helicopter assault forces, and representatives of the landing force command group. The center begins its functioning when amphibious

assault operation planning begins, and completes its activities upon deployment on shore of the landing force logistics CP.

Landing Force Command and Control Elements. The highest shore-based command element is the landing force commander's CP, which includes the fire support direction center, direct air support center, reconnaissance section, and electronic warfare/reconnaissance coordination center. The CP maintains communications on 12 radio nets (10 shortwave, 2 ultrashortwave); the aviation and logistics command posts are subordinate to it. The landing force commander's CP is usually embodied in the command post of a marine amphibious division (MAD), amphibious brigade (MAB) or amphibious battalion.

Main, reserve, forward (tactical) and rear (administrative) command posts are established in the marine amphibious division. The main CP is assigned planning and coordination of divisional combat operations. It contains all major staff elements, personnel and equipment. This CP is positioned at the location of one of the division sub-elements, removed from the forward sub-elements but not in excess of radio horizon range, and in an area that allows it to reliably camouflage its position. Typical configuration of main CP elements of the marine amphibious division and brigade are as shown in fig 1. Main CP activities are directed by the chief of staff. The CP maintains communications over 22 radio nets (11 shortwave, 11 ultrashortwave).

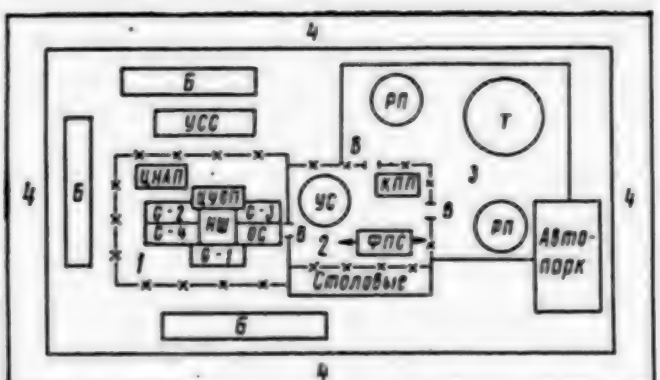

Fig 1. Typical Configuration of MAD/MAB Main CP.

Key:

1.	Operations center	ОС	Communications officers
2.	Support area	ЦУОП	Fire support direction center
3.	Entry area	ЦНАП	Direct air support center
4.	Security zone	УС	Communications center
НШ	Chief of staff	УСС	Remote communications
G-1	Personnel (staff section)	ФПС	Courier station
G-2	Intelligence	КПП	Checkpoint
G-3	Operations	Т	Helipad
G-4	Maintenance and logistics	РП	Unloading platforms
Столовые	Mess hall	В	Entry
Автопарк	Motor pool	Б	Bivouac

The reserve CP is designated to replace the main CP in case of its disruption or relocation. It is constituted by representatives of the main division staff elements and located, as a rule, at the artillery regiment CP. It maintains communications over 12 radio nets (6 shortwave, 6 ultrashortwave). The forward CP is assigned direct control of division units in the main area of combat operations when the units are widely dispersed or rapidly advancing. Its numerical strength is the minimum necessary--usually the division commander, his aide, chiefs of the operational and reconnaissance staff sections or their deputies, officers of artillery, aviation, air defense and communications, and communications and security sub-elements. As a rule, relocation of the forward CP is accomplished by helicopter. Communications are conducted over two ultrashortwave radio nets--tactical and reconnaissance. The rear CP controls the division rear and is located in the division rear area.

Main (tactical) and reserve (administrative) CP's are organized for the marine amphibious brigade and marine amphibious battalion. They are constituted by dividing the staffs into two identical groups. The commanders are stationed at the main CP, which is itself located at the main CP of one of the battalions or companies. Reserve CP's are headed by the brigade and battalion deputy commanders.

Numbers of radio nets and radios used for command and control of units and sub-elements are as shown in the table.

Radios/Nets Used in Command and Control of Marine Units and Sub-Elements

Unit/Sub-element	Radio Nets		Radios	
	sw	ultra sw	sw	ultra sw
Marine division	4	6	159	over 800
Marine regiment	1	3	36	254
Artillery regiment	1	4		
Marine battalion	-	2	9	73
Artillery battalion	-	3		
Reconnaissance battalion	4	3	36	78
Other battalions	-	1		
Companies	-	1	1	14

Fire Support Direction. Combat operations conducted by the marine amphibious division, brigade or battalion in an amphibious assault operation are accompanied by fire support, which may include artillery (nuclear) and aviation. Overall direction of the operations of landing support assets in the operation is exercised by the landing support force coordination center; in marine units battalion and higher--by fire support direction centers.

The fire support direction center is the command and control element for marine units battalion and higher. It includes the fire support coordinator, support unit representatives, officer technical personnel, a target reconnaissance officer, communications personnel, plotters and necessary equipment. Through representatives, the center exercises liaison with higher, subordinate and mutually-supporting fire support direction centers, and with other units and elements concerned with fire support. The artillery representative maintains liaison with artillery unit fire direction centers, representatives of higher, subordinate and mutually-supporting fire support direction centers and, when necessary, with air observers. The aviation representative maintains liaison with the direct air support control center, with representatives of higher, subordinate and mutually-supporting fire support direction centers, and with other air support control elements. The naval artillery representative maintains liaison with artillery support ships, naval artillery representatives of higher and mutually-supporting fire support direction centers and, when necessary, with naval forward observer stations on shore. The fire support direction center of the division main CP maintains communications on 12 nets (6 shortwave, 6 ultrashortwave); the reserve CP—on 3 (1 shortwave, 2 ultrashortwave); regimental CP--on 12 (4 shortwave, 8 ultrashortwave); and battalion CP—on 13 (2 shortwave, 11 ultrashortwave).

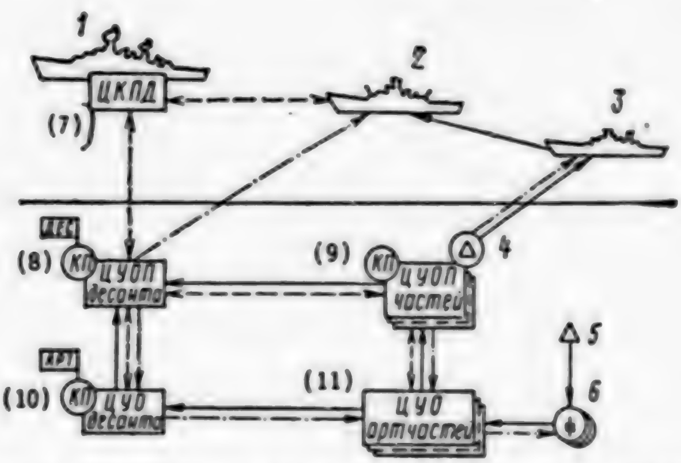

Fig 2. Command and Control of Amphibious Assault Artillery Support

Key:

1. Amphibious task force flagship
2. General artillery support ship
3. Direct artillery support ship
4. Naval artillery on-shore fire adjustment center
5. Forward observer post
6. Artillery batteries
7. Landing force support coordination center
8. Fire support direction center (landing force)
9. Fire support direction center (units)
10. Fire direction center (landing force)
11. Fire direction center (artillery units)

Artillery support (fig 2) in the disembarkation phase is provided by naval artillery which is joined, as units disembark on shore, by divisional artillery and that of marine reinforcement units. In addition to the fire support direction center, artillery support command and control elements include fire direction centers, forward observation posts and shore-based stations for adjustment of naval artillery fire, and naval artillery unit CP's providing general and direct artillery support.

The fire direction center is organized at the artillery command post of battalion and higher. A fire control officer operates at battery level. The center collects target reconnaissance data and distributes targets among the sub-elements. It maintains liaison with higher, subordinate and mutually-supporting fire direction centers and, when necessary, with artillery and forward elements concerned with fire support. The artillery regiment's fire direction center communicates on six ultrashortwave radio nets, the artillery battalion—on seven, and the battery fire control officer—on six.

Ships providing general support for the amphibious assault maintain communications over three artillery support nets (two shortwave, one ultra-shortwave); direct-support ships—over two (shortwave and ultrashortwave).

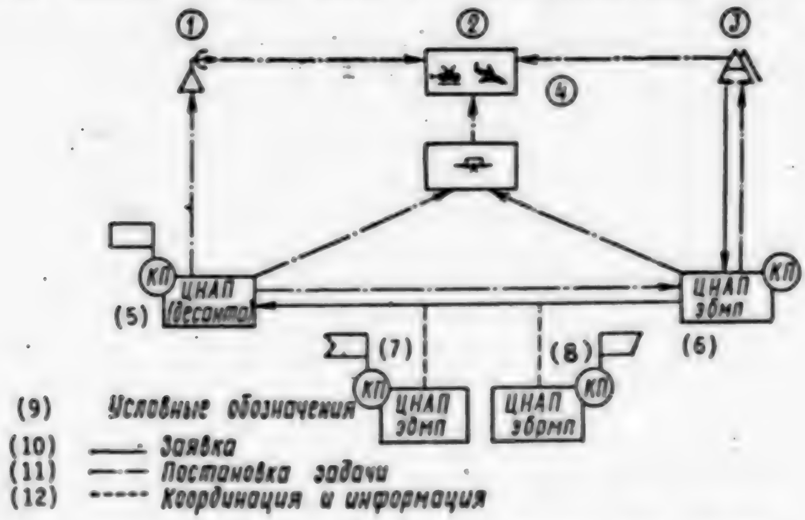

Fig 3. Air Support Command and Control

Key:

1. Radar guidance-to-target post
2. Air support
3. Forward air controller
4. Air support controller (air-based)
5. Direct air support center (DASC) for the landing force
6. DASC (Marine amphibious battalion)
7. DASC (Marine amphibious division)
8. DASC (Marine amphibious brigade)
9. Conventional designation
10. Requisitions
11. Mission allocation
12. Coordination and information

Air support for the landing (fig 3) is accomplished by carrier-based and marine aircraft. The main air support command and control elements are the tactical air control center and tactical air direction center, the direct air

support center, air direction stations, forward posts and posts for radar guidance to target.

The direct air support center is subordinate to the tactical air control center or tactical air direction center and manages direct air support for the operation. It is the first of all the air control elements to deploy on shore and is located next to the fire support direction center at the landing force CP. It receives direct air support requisitions from assault units, determines required combat resources, plans and executes requisitions, and coordinates execution of air strikes directed by forward air controllers, air direction stations and radar guidance centers. The direct air support center maintains communications on 21 radio nets (12 shortwave, 8 ultrashortwave, 1 combined).

The air support direction station (ASDS) is part of the divisional, brigade (regimental) and battalion command posts. It facilitates coordination between the appropriate command post and air support control elements. The division may have up to 13 ASDS in all. Division and brigade (regiment) ASDS maintain communications over two radio nets (shortwave, ultrashortwave); battalion ASDS--three (one shortwave, two ultrashortwave).

The forward air controller is subordinate to the ASDS and directs air assets to their targets. It is located at the company CP and maintains communications on its ultrashortwave radio net.

The radar guidance-to-target post is subordinate to the air defense sector control center and exercises automatic control and direction of aviation to their targets under conditions of poor visibility and low cloud cover. The air wing may deploy three such posts. They are moved in by helicopter and operate in the marine units. They maintain communications on five radio nets (3 shortwave, 2 ultrashortwave).

Air Traffic Control. Air activity in the amphibious assault operation is governed by an air traffic control (ATC) system set up in the area of the operation. Its elements include air traffic control stations, helicopter direction center, control posts at the LZ for helicopter disembarkation and airborne drop zone, and radar observation stations.

The air traffic control station, situated at an airfield, is subordinate to the air defense management center and is responsible for take-offs, landings and air traffic control. The MRAALS course glide-path system for landing is used here, as are AN/TRN-16 and -33 maritime radio beacons, AN/TRN-29 radio beacons of the TACAN system, surveillance radar and AN/TRC-131A radios. ATC stations will soon be equipped with MATCALS, a new, containerized, automated system of landing and air traffic control, which provides for simultaneous control of take-off or landing for six aircraft.

The helicopter LZ control post is subordinate to the helicopter direction center. It employs a microwave landing system (AN/TIN-30) and maintains communications on three ultrashortwave radio nets.

The radar observation station is subordinate to the direct air support center and monitors the position of its aircraft along designated flight routes in the area of combat operations. It is also utilized as a radar beacon. Two such stations may be deployed to the air wing, airlifted by helicopter.

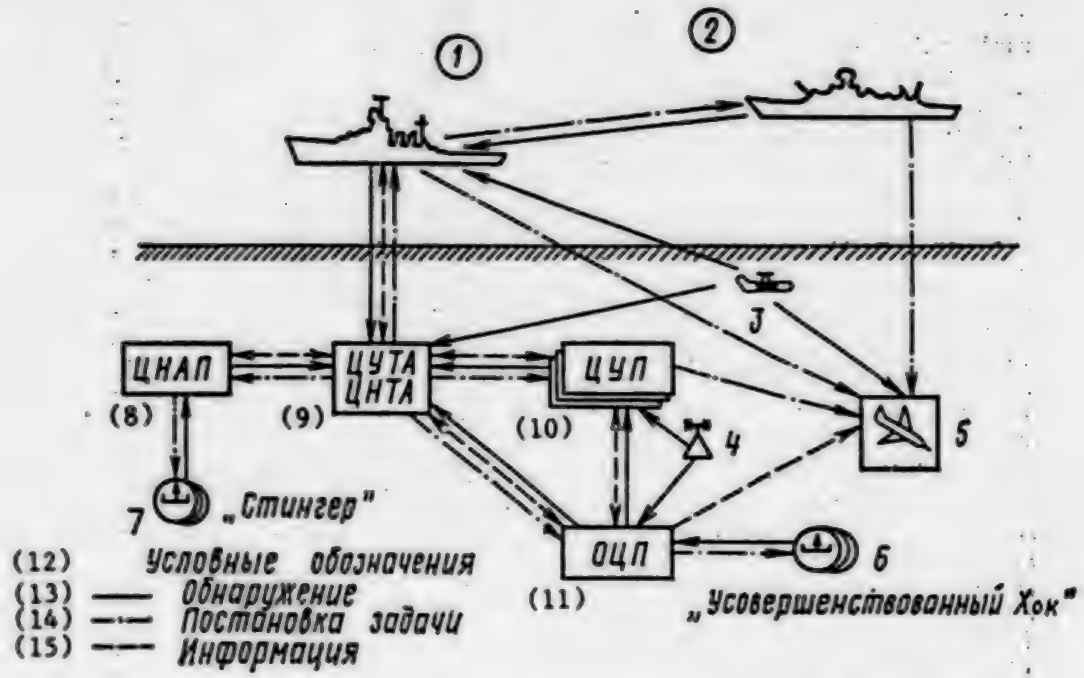

Fig 4. Air Defense Command and Control in the Amphibious Assault Operation

Key:

1. Amphibious task force air defense center
2. Ship-based air defense sector control center
3. AWACS aircraft (command and control)
4. Air defense radar
5. Combat air patrol
6. Improved HAWK batteries
7. Forward area air defense (Stinger)
8. Direct air support center
9. Tactical air control center and tactical air direction center
10. Air defense sector control center
11. Air defense operations center
12. Conventional designation
13. Early warning
14. Mission allocation
15. Data/information

Air Defense Organization. The air defense is organized upon landing of the amphibious assault force and its conduct of operations on shore. Its command and control elements include air defense sector control centers, an air defense operations center, naval air defense sector control centers, rocket artillery control centers, guided missile section CP's, and air defense radar stations (fig 4).

The air defense sector control center is the basic air defense element. It is subordinate to the tactical air control center or tactical air direction center and exercises operational air defense control in the designated sector. The center is tasked with detection and identification of air targets, control of enemy air and missile intercepts in its sector, and providing navigational flight security for its air assets during mission accomplishment. Up to three of these centers may be organized for an air wing, each of which must perform tactical air direction center functions and maintain communications on 16 radio nets (9 shortwave, 6 ultrashortwave, 1 combined).

The air defense operations center is subordinate to the tactical air control center. It exercises control of air defense missile units in the area of assault force operations and is located at the command post of the Improved Hawk Battalion. Communications is conducted over 13 radio nets (9 shortwave, 3 ultrashortwave, 1 combined).

The rocket artillery control center is usually subordinate to the air defense operations center, but individual batteries may be subordinate to the air defense sector control center. Communications are maintained on 5 radio nets (3 shortwave, 2 ultrashortwave). The air defense battery is linked with section command posts through ultrashortwave digital radio channel. When a section operates independently from the battery, it communicates over the same radio nets as the rocket artillery control center.

The air defense radar station is subordinate to the air defense sector control center and accomplishes early detection of low-flying targets. It is equipped with the AN/TPS-59 radar and maintains communications on 8 radio nets (6 shortwave, 1 ultrashortwave, 1 combined).

Reconnaissance command and control is accomplished by the joint reconnaissance center of the amphibious assault task force, and by the reconnaissance section of the landing force commander's staff after disembarkation has taken place and he has assumed operational command on shore. (Editor's note: For details on reconnaissance command and control in the amphibious assault operation, see ZARUBEZHNOYE VOYENNOYE OBOZRENIYE, 1984, No 9, pp 59-63). In addition to using the main radio nets of the task force and assault units, ground reconnaissance forces employ 9 radio nets specially for their purposes (5 shortwave, 4 ultrashortwave). Marine reconnaissance aviation also uses 9 nets (ultrashortwave).

Logistics support for the amphibious assault operation includes technical maintenance and service support for the landing, engineer and emergency rescue support, transport shipments, and medical and routine logistical support for the assault units. Logistics support command and control during the landing phase is accomplished by technical maintenance groups stationed on the ships from which command and control is being exercised. The groups manage the filling of logistics requisitions by assault force elements and assist the command group on shore, providing detailed information on location and status with respect to the offloading of personnel, equipment and supplies.

A landing security detachment provides support to the marine amphibious division landing. It is comprised of an appropriate number of shore party groups and teams depending on the number of sectors and landing sites--one group per regimental landing force and one team per battalion force. A communications group is assigned from the shore party team to the battalion CP, sets up telephone communications between them and passes on battalion requisitions to the shore party group or team headquarters. The latter then communicates the requisitions by ultrashortwave radio or underwater cable to the technical maintenance support group on board the command ship. Under certain circumstances, requisitions may be communicated by radio directly to the technical maintenance support group.

The landing security detachment allocates to the helicopter assault battalion CP an assault security team consisting of an LZ control post and a communications group. The communications group transmits requisitions by ultrashortwave radio to the helicopter assault technical maintenance group. The requisitions are executed by the helicopter technical maintenance center, located on the ship where the assault helicopter commander is stationed along with the helicopter direction center. After disembarkation is completed and the assault helicopter group deployed to shore, the helicopter combat maintenance center begins operations. This center provides logistics support to the assault units during their combat operations on the shore using assault transport helicopters. After the entire logistics group has disembarked to shore, the assault logistics CP begins to operate, and in some instances the reserve CP as well. In addition to telephone circuits, the CP utilizes 13 radio nets (7 shortwave, 3 ultrashortwave, 3 combined).

The United States Navy is constantly developing and improving its command and control system for the marines. A program is currently being implemented to establish an automated control system, which will include 10 subsystems--command and control of combat operations, fire support, position finding, aviation, reconnaissance, communications, combat operations analysis and evaluation, modeling and tactical exercise evaluation, technical maintenance support, and personnel administration.

9768
CSO: 1801/182

NUCLEAR POWER REACTORS ON BRITISH SUBMARINES

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 87 (Signed to press 3 Apr 87) pp 52-56

[Article by Major G. Stasov: "Nuclear Power Reactors on British Submarines"]

[Text] With regard to the development and production of nuclear submarines, the British naval command has relied greatly on the experience of the United States, where use of nuclear energy in building submarines underwent development as early as the beginning of the 1950's. Nuclear power reactors have provided submarines practically unlimited cruising range, a great deal of autonomous capability (limited, in fact, only by the crew's psychological state and physical endurance), and high speed of underwater movement over prolonged periods.

Foreign press sources indicate that the decision to build the first British nuclear submarine was made in 1954. The American pressurized water reactor (PWR) with enriched uranium (fig 1) was chosen as the basic nuclear reactor. The final decision with respect to type of fuel was made in 1957 during further work. It is also reported that, in order to complete nuclear submarine construction by 1963, Great Britain's naval command purchased a steam-generation system in the United States in 1958, with pressurized water reactor S5W (fig 2). This system is being used in nuclear submarines of the Skip Jack variety.

The double-loop thermal reactor design of U.S. submarines (fig 3) was selected as the base design in developing the British nuclear reactor. Its principle of operation is as follows.

The water (twice-distilled) in the PWR is used both as a neutron moderator and heat-transfer agent, enabling construction of a compact submarine nuclear reactor. As a neutron moderator, the water lowers the energy level of neutrons released in the reactor core to that of "thermal" neutrons. As a heat-transfer agent, the same water cools the reactor core. The fuel--a highly enriched mixture of fissionable isotopes uranium-235 and uranium-238--is placed in the fuel-element assemblies with zirconium alloy casings. The fission chain reaction of the nuclear fuel is regulated by a protective control system, which includes rods and grates made of hafnium with a high cross section for seizure of thermal neutrons.

Uniform pressure is maintained in the first loop by a volume equalizer filled 60 percent with water, 40 percent with steam. Electrical power is used to heat up the water and vaporize it when the reactor is started up. The expanding steam increases pressure in the system. Simultaneously, water from the first loop is delivered to the volume equalizer. This causes the steam to condense, which lowers the pressure in the first-loop system.

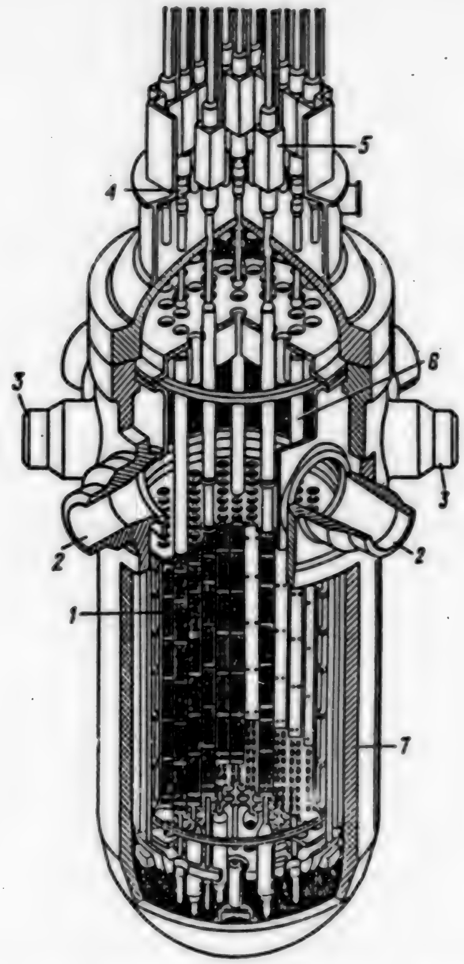

Fig 1.. Pressurized Water Reactor (PWR) Used on U.S. Submarines

Key:

1. Fuel-element assemblies
2. Outlet—first-loop heat transfer agent
3. Inlet—first-loop heat transfer agent
4. Feed-in to gauges
5. Control rod actuators
6. Control rods
7. Reactor core

Heated up in the reactor, the heat-transfer agent reaches the steam generators (of which there are two), where heat is transferred from first-loop to second-loop heat transfer agent. First-loop main circulation pumps then return the water to the reactor. During low-noise submarine operation, the first loop's inherent circulation mode is used. Here the temperature gradient between water coming from the reactor and water returning to it is about 15 degrees Celsius (about 280 and 265 degrees Celsius, respectively). Steam formed in the steam generators under a pressure of about 42 atmospheres and temperature of about 250 degrees Celsius moves to two turbo-generators and the two main turbines, then to their condensers. From there the condensate is again carried to the steam generators.

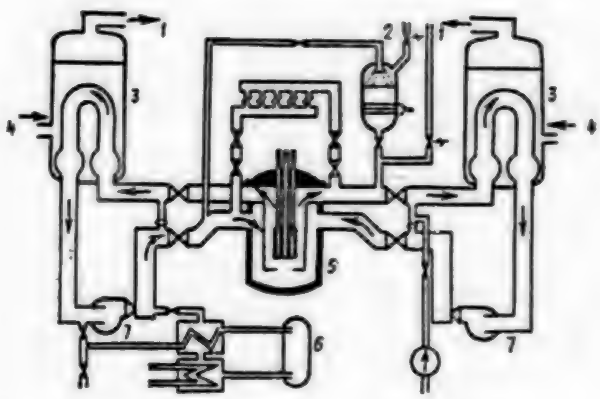

Fig 2. Nuclear Steam-Production Unit with Pressurized Water Reactor

Key:

1. Steam
2. Volume equalizer
3. Steam generator
4. Water fed from main condenser
5. Reactor
6. First loop water treatment system
7. First loop main circulation pump

The main turbines with pressure regulator comprise the main turbogear unit and function through a release coupling attached to a screw propeller. In a low-noise operating mode, the electrical energy produced by the turbo-generators passes through an alternating-to-direct current transformer to the main propulsion motor. At this time the main turbogear unit disengages from the shaft line through its release coupling.

In order to test various types of nuclear power reactors with an aim towards developing and improving them, a test-rig prototype was developed in Downry and received the designation DSMP (fig 4). To this day, according to western press reports, the DSMP is one of the basic links in the nuclear power reactor development program and enables not only the testing of new technology and development of promising steam-generation units, but also the training of personnel in servicing them.

nuclear reactor. Its solid casing was made of low-alloy steel and the inside lined with stainless steel by a fuse-welding process. The first loop and the main elements of the steam-generation unit were made of stainless steel and built according to American standards of pipe and conduit assembly and high-pressure casing construction. According to the foreign press, stainless steel was used due to a lack of operational data on a reactor's functional reliability with ferrite steel construction. The second loop was relatively simple thanks to fewer valves and joints. In addition, the circulation layout of the main condenser was integrated with that of the turbo-generators. The number of remote controlled valves in the reactor compartment was also significantly reduced.

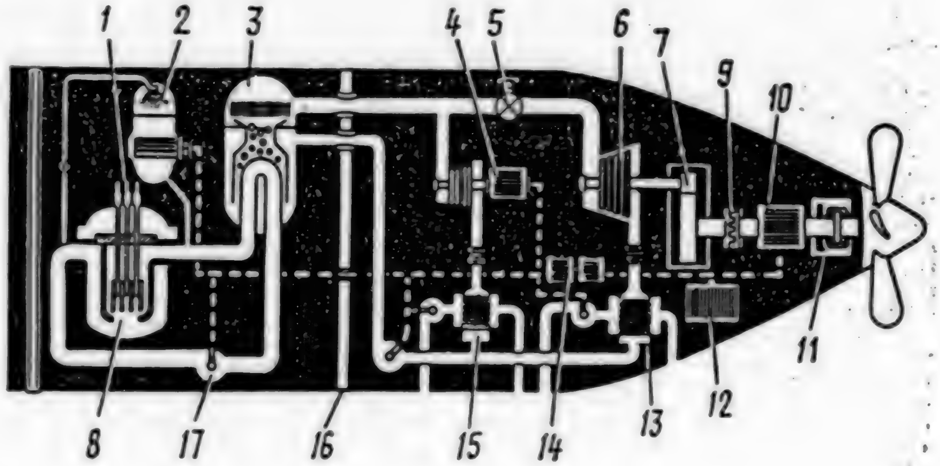

Fig 3. Power Unit for Nuclear Submarines (schematic is limited to one each steam generator, turbo-generator and main turbine for simplicity)

Key:

1. Control rod actuators
2. Volume equalizer
3. Steam generator
4. Turbo-generator
5. Main steam valve
6. Main turbine
7. Main pressure regulator
8. Nuclear reactor
9. Release coupling
10. Main propulsion motor
11. Main thrust bearing
12. Storage battery
13. Main condenser
14. Alternating current transformer
15. Turbo-generator condenser
16. Protective bulkhead separating reactor and turbine compartments
17. First loop main circulation pump

In 1964 funds were allocated for development of a second-generation nuclear submarine (of the Swiftsure variety). During the course of this effort it was felt the experience of Valiant-type nuclear submarine reactor development should be taken into account. It was necessary to further decrease the noise level of mechanism functioning and increase the ship's invulnerability on the

whole. The nuclear power reactor design should become a subsequent development of the existing one, utilize space more efficiently in positioning equipment, improve equipment operating conditions and enhance reliability. By this time, the foreign press notes, there had already appeared a number of deficiencies in Valiant-type submarine reactors.

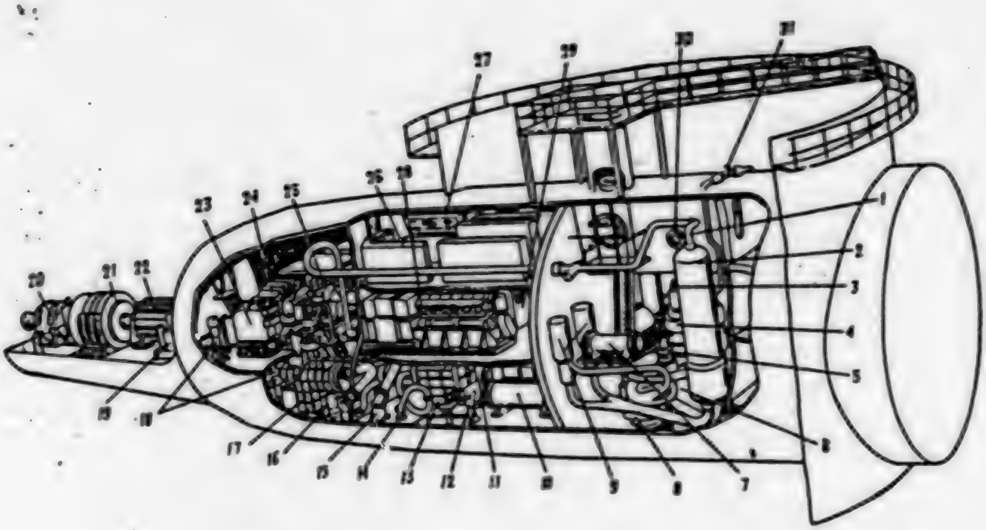

Fig 4. Placement of Nuclear Power Unit Equipment of the Valiant Submarine on the DSMP Test Rig

Key:

1. Main steam supply line
2. Steam generator
3. Electric motor for control and protection system
4. Nuclear reactor
5. First loop main cut-off valve
6. Biological protection tank
7. Auxiliary loop heat exchanger
8. Volume equalizer
9. First loop main circulation pump
10. Thermal container
11. Turbo-generator
12. Circulation pump for turbo-generator condenser
13. Turbo-generator condenser
14. Turbo-generator circulation duct
15. Main circulation duct
16. Main circulation pump for the steam turbine system condenser
17. Main condenser for steam turbine system
18. Drain pump
19. Carbon dioxide absorption unit
20. Thrust bearing
21. Main propulsion motor
22. Release coupling
23. Air conditioning unit
24. Pressure regulator
25. Main turbine
26. Auxiliary control panel
27. Main control panel for the nuclear power unit
28. Diesel generator
29. Switches
30. Viewing aperture
31. Cooler for emergency shut-down cooling of the reactor

First of all, the steam production unit--particularly the steam turbine system--was highly complex. The presence of condensers in the turbo-generators for providing electric propulsion using an auxiliary motor when the main turbogear unit is idle required additional condensation and circulation pumps, piping for the sea-water cooling system, and monitoring equipment.

Secondly, the auxiliary sea-water cooling system was highly complex, increasing the likelihood of a fatal accident while the submarine was underwater. In addition, valve-body castings subject to sea-water pressure made of nickel-aluminum bronze did not have the required density. According to western press accounts, this matter has not been resolved to this day.

Thirdly, the nuclear submarine had an increased noise level at low speeds, mainly due to the reactor's operating machinery. The reason for the noise amplification right up to the antenna on the bow was design and construction deficiencies.

British experts emphasize that in order to eliminate the enumerated deficiencies and others in the Swiftsure-type design, each turbo-generator and main turbogear unit must have a common dual-channel condenser to simplify the circulation system and reduce the length of conduit used in the sea-water cooling system in the solid casing. In addition, the length of the circulation layout can be reduced by positioning a circulation pump in the water box of the condenser between clusters of conduits. The main way to reduce the amount of auxiliary equipment under pressure of sea water is to introduce an intermediate cooling loop using fresh water under low pressure. Transfer of heat from this loop should be accomplished in heat exchangers cooled by sea water. Pumps like those in the main condensers must be positioned in the water boxes of the heat exchangers. In fact, however, technical reasons dictate the use of ordinary pumps on the submarines, located outside the water boxes.

The noise level in submarines of the Swiftsure variety was successfully reduced by using an effective damping system and eliminating the possibility of "acoustical bridges." Power unit machinery--the main turbogear unit, turbo-generators and main condensers--were assembled on a common platform whose damping system provided the decreased noise level desired with full power applied, and compensated for shaft torque at low submarine speeds.

The Swiftsure design provided for a simplified reactor with redundancy in certain systems to eliminate the consequences of possible accidents. It increased equipment reliability and accessibility for repair with thorough testing of both ground-based and submarine-mounted reactor models, and offered reliable guarantees with respect to monitoring quality in the process of manufacturing the equipment and assembling it on submarines.

In 1967 the Vickers-Armstrong firm received the order to construct the Swiftsure nuclear submarine. The first new B-type reactor core was developed the same year on a DSMP test rig, and in August 1968 achieved criticality. Prior to beginning series production of the core, the reactor had to undergo testing with it at full power to the stage of significant fuel depletion and its design reliability had to be confirmed over a two-year period.

The Swiftsure submarine was launched in January 1971, and in March 1973 entered Great Britain's navy. Foreign press reports state its operational record has confirmed the correctness of changes introduced in the reactor design as compared with that of the Valiant.

The reliability of the nuclear submarine was enhanced by simplifying the machinery and increasing the quality of design, manufacture and assembly of the equipment. The noise level was lowered thanks to careful honing and improvement of the machinery and assemblies after identification of deficiencies during the initial stages of acoustic testing.

Further development of the nuclear power reactor in Great Britain is tied to construction of a third-generation nuclear submarine (of the Trafalgar variety). Special attention in designing the reactor was devoted to further increasing the reactor's life cycle and significantly reducing its functioning noise level.

Efforts were begun in 1968 to develop steam-production units for these submarines. Design of the type Z reactor core was completed by 1971 and manufacture of the experimental model begun. Testing was conducted in Downry.

According to foreign press reports, equipment in the first loop of the new reactor was improved, small-diameter valves and joints were perfected and vibration in the first loop's circulation pump eliminated.

The main circulation pump was developed and improved in two areas--reducing the level of noise emitted and enhancing the operating reliability through improvements in installation quality. Noise emissions were reduced by decreasing somewhat the pumps' rotation speed and power, improving their balancing and coaxial alignment, and stabilizing and decreasing dynamic forces in the bearings. The quality of installation was enhanced by observing more stringent standards in the welding of electric motor casings, and by raising the quality of inspection of welded joints.

According to the western press, the building and development of nuclear power reactors for Trafalgar submarines have shown that capabilities are almost entirely exhausted with respect to further increasing the power and duration of the life cycle of this type of reactor, or further reducing machinery noise.

Efforts were therefore begun in Great Britain in the second half of the 1970's to develop a new PWR with its own distinctive design for equipping prospective ballistic missile submarines with Trident missiles.

Design of the new reactor--designated PWR-2--provides substantive changes in the construction of its fundamental units and their re-configuration. It is expected to undergo development based on the nuclear submarine power facilities of the Swiftsure and Trafalgar type, utilizing the achievements of modern technology to the maximum possible extent, and should be distinguished by virtue of its increased power, decreased major dimension specifications, increased operating life between repairs, improved reliability and accessibility for repair, reduced noise emission, lower cost, etc.

It is reported in the foreign press that Great Britain is today nearing completion of the PWR-2 design, for which a steam turbine facility is being developed that will be tested over the course of two years following construction. The reactor will then be installed on board the Vanguard nuclear submarine, the lead nuclear ballistic missile submarine in a series of four. The submarine was laid down in September 1986 and is scheduled to enter service in the mid 1990's.

As a result of the intensive efforts conducted in Great Britain over the past quarter century in the sphere of nuclear shipbuilding, the second largest nuclear submarine fleet in the capitalist world, 19 submarines, has been developed. It is an important instrument in the hands of British ruling circles, striving jointly with the United States and their other NATO partners to attain military superiority over the USSR and the other nations of the socialist community.

9768
CSO: 1801/182

CONTACT MINESWEEPERS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 87 (Signed to press 3 Apr 87) pp 56-58

[Article by Captain 2d Rank S. Usov, Captain 3d Rank A. Kolpakov: "Contact Minesweepers"]

[Text] The experience of World War II and subsequent regional wars and armed conflicts has shown that large-scale use of mines by an enemy at the approaches to naval bases and in their internal waters significantly complicates submarine and surface vessel egress to the sea. Passage becomes possible only after channel sweeping has been accomplished and the ships move out behind a trawl. Therefore, in addition to their preparations for using mines offensively, naval commands of the nations of the aggressive NATO bloc devote a great deal of attention to developing means, methods and assets for counter-mine warfare, particularly through the use of mine sweepers.

Contact minesweepers of widely varying design which meet specified requirements are employed to sweep for moored mines, anchored at various depths and armed with both contact and variable-time detonators. The minesweepers are designed to counter floating mines, mines drifting at a prescribed depth, contact and influence mines, protective mines of all types.

Today's contact minesweepers are complex hydrodynamic entities, which include the operating (sweeping) unit outfitted with cutters or explosive cartridges, depressor, otters and protective apparatus. There are depressors designed to maintain trawls at a given depth both with respect to the water's surface and the sea floor. Otters of a multiplane or glider variety are usually used.

The following trawls are used by naval forces of the NATO countries--high-speed paravane, low-speed broad-coverage, sea-bottom and net.

High-speed paravane trawls are mainly used in reconnaissance trawling and safe conduct of ships. They consist of two trawl sections about 550 m in length made of galvanized steel cable, two paravanes, a depressor, tow line, cutters, regulating device, two spans and two buoy markers. Trawl towing speed reaches 26 knots; the trawling zone width is about 150 m (at full speed); trawling depth is 6-18 m (depending on how the paravane is sunk). The operating

principle of the high-speed trawl is based on grinding through the mine mooring cable or shearing it with the cutters.

Low-speed contact trawls are designed to destroy minefields and conduct ships through a waterway. Width of the trawling zone is up to 650 m; depth—from 10 to 150 m; towing speed—6 to 12 knots (depending on the trawl depth and dragging capabilities of the ship). The minesweep portion is 550-850 m in length and made of a special four-strand cable up to 20 mm in diameter. The trawls may be ordinary or slightly magnetic.

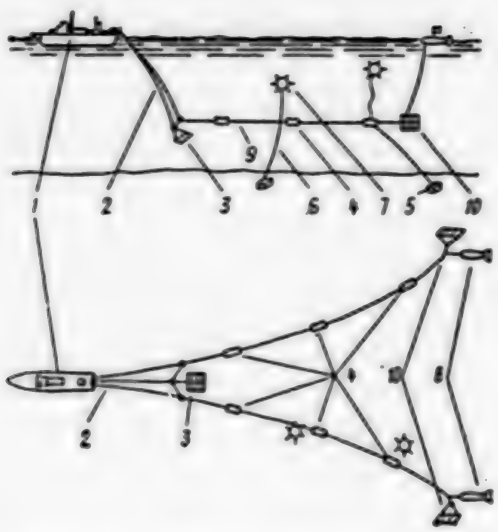

Fig 1. Overall View of Oropeza Contact Trawl Towed by Minesweeper.

Key:

1. Minesweeper
2. Towline
3. Depressor
4. Cutters
5. Mine anchor
6. Mine mooring cable
7. Mine
8. Guide buoy
9. Sweep section
10. Otter

The most widely used contact naval minesweepers in the United States Navy and the navies of other countries in the aggressive NATO bloc are the American Oropeza and British Type-A (there are many variants of these, differing mainly in the dimensions of individual components). This enables a certain type of trawl to be used from ships with various dragging characteristics (open-sea, coastal and harbor minesweepers, launch sweepers). Thus, the open-sea minesweepers of U.S. naval forces include Oropeza Mk 1, Mk 2 and Mk 3; the coastal sweepers—Mk 4; and the harbor sweepers—Mk5 and Mk5C. Their units and components may be used to constitute single one-sided, single two-sided and twin minesweepers. Some of these use a chain instead of cable for the sweeping component, which weights the trawl but increases its survivability. The sweeping configuration for moored mines used by Oropeza is shown in fig 1.

The main tactical and technical features of the most widely used contact minesweepers found in the inventories of the United States, Great Britain and Japan are indicated in the table below.

The sea-bottom trawl is towed by two minesweepers and has elements of both Oropeza and Type-A. It involves the attachment of chain couplings to the ends of the sweeping gear, joined to one another by swivels. There are also specially designed bottom-dwelling trawls which are towed, as a rule, by two ships travelling at slow speeds (4-6 knots) at depths up to 90 m.

Net trawls consist of netting fastened to a special frame, which captures mines adrift or special floating mines on the water surface or at some slight depth. U.S. naval forces also have net trawls for sweeping mines lying on hard floor at depths of up to 42 m.

During their aggressive war in Vietnam, U.S. naval forces used bottom-dwelling contact trawls in the form of grapplers with special attachments for sweeping mud and sand-filled mines on the bottom and for cutting off the wire leads to command-detonated mines.

The Mk103 helicopter contact trawl was developed based on the Oropeza, using all non-magnetic components. The trawl portion is outfitted with mechanical and explosive cutters. The main buoys and floats are made of foam plastic. A winch on board the helicopter is used to deploy the trawl, which may be passed to another helicopter in the air.

Deepwater contact sweeps are currently being developed in the United States naval forces (with depth capability of several hundred meters) for their sea and fleet minesweepers. At the same time, development of otters and depressors which would provide trawl submersion and thinning out to the required width is underway. Deepwater trawls are also being developed in Great Britain and Japan.

Main Tactical and Technical Features of Contact Sweeps

Designation (country)	Width of Sweep (m)	Maximum Depth (m)	Tow Speed (knots)	Carriers
Oropeza Mk 1 (USA)	up to 600	100	6-12	Open-sea minesweepers
OropezaMk4 (Great Britain)	240-320	40	6-12	Open-sea and coastal mine-sweepers
Oropeza Mk 5 (USA, Gr Br)	240-320	27	4-8	Harbor minesweepers
Mk 103 (USA)	50	30	25	Helicopters
Mod 53 (Japan)	300	up to 60	8	Coastal m/s

The WS Mk9 deepwater paired contact trawl has been developed by Great Britain and is in the inventory of her naval forces for deepwater minesweeping. Its main feature is the use of a single tow line for the depressor and sweep gear, enabling the minesweeping apparatus to be maintained at a great depth. An automatic monitoring system based on strain measurements was developed for control of deepwater trawl movement, using a winch to change tow line length. The operating trawl components are cutters and exploding cartridges positioned at 90 m distances from one another. The WS Mk9 is in the British navy's inventory of new minesweepers of the Rivers variety. Fig 2 depicts the operation of this minesweeping system.

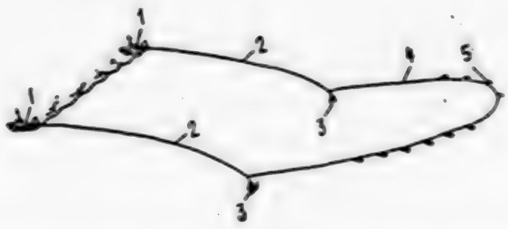

Fig 2. Towing Schematic for the WS Mk9 Paired Deepwater Contact Sweep.

Key:

1. Minesweepers
2. Towline
3. Depressor
4. Sweep section
5. Cutters or exploding cartridges

The main operating components of contact trawls for mine mooring cables are cutters, which may be mechanical or explosive. Sweeps whose purpose is to mark or immediately destroy moored mines under the water utilize signalling or exploding devices triggered upon passage.

The oldest variety of mechanical cutters, used universally in World Wars I and II, is cutters with blades secured in a jaw-type device, where the mine mooring cable is cut, or in the extreme case--torn off. Such cutters are not capable, however, of cutting chain mooring cable. Moreover, the cable may become wedged in the jaw-device, resulting in the sweep gear being torn off. Therefore, the United States and NATO bloc countries today use contact trawls with mechanical cutters which will cut through a hawser or chain mooring cable using a mechanical component (blades) activated by explosive charge.

The West German navy employs the DM 19A1 explosive cutter in its contact sweeps. An irregularly shaped blasting charge inserted in the cutters can penetrate a steel rod 26 mm in diameter and can destroy not only a mine mooring cable, but also a steel-link chain with its braces (for steel up to 20 mm in diameter). The maximum operating depth for the cutters is 300 m. A modified version is under development which will be able to cut at depths of

up to 700 m. According to foreign press reports, development of contact minesweeps is proceeding along the following lines: increasing the operating depth of the trawl gear, reducing its weight, speeding up the laying and recovery process, and decreasing the number of attendant personnel required.

New forms of cable, and new depressors and otters are being developed, which will substantially decrease the resistance of the towed minesweeping gear.

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CSO: 1801/182

RS30 PRODUCTION IN WESTERN EUROPE

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 87 (Signed to press 3 Apr 87) pp 66-67

[Article by Captain 1st Rank Yu. Shangin: "RS30 Production in Western Europe"]

[Text] The MIC-MLRS International Corporation for production of the RS30 Multiple Launch Rocket System was established in September 1986. Member firms are LTV Aerospace and Defense (USA), Diehl (FRG), Hunting Engineering (Great Britain), Aerospatiale (France), and SNIA-BPD (Italy). The American firm owns 60 percent of the shares of the new corporation, its European partners--the remainder.

The RS30 was developed in accordance with NATO plans to equip the troops with effective, highly mobile rocket artillery and various types of the newest ammunition. In 1979 an agreement was signed between the United States, West Germany, Great Britain and France (Italy joined in 1982) with respect to joint development and production of the RS30 MLRS. It was envisaged that this system would become the standard for the armed forces of the NATO countries. Field testing of the new system was completed in 1983 and the American firm Voight (a division of LTV Aerospace and Defense) began MLRS series production. The cost of a launcher in 1983 was 2.3 million dollars, and of a free-flight rocket--about 6 thousand. The U.S. Army is planning to purchase 369 launchers and about 500,000 rockets by 1988. The value of the entire program for the U.S. armed forces was estimated in 1983 to be four billion dollars. About 300 launchers and 100,000 rockets were produced by fall 1986. The cluster-type rocket warhead can be fitted with M77 hollow-charge fragmentation elements (644) or AT-2 anti-tank mines (20) developed by West Germany. In the final stage of development are warheads with contact elements which use homing guidance over the final segment of flight trajectory, thus substantially increasing the rocket's effectiveness in combatting armored targets. Foreign experts believe these will enter the inventory in the beginning of the 1990's.

The purpose of the MIC-MLRS Corporation is to prepare for RS30 production, series output and sale from West European enterprises.

RS30 launcher and rocket research and testing for European production is expected to be completed the end of 1987, beginning of 1988. At the end of

1988, the first systems will enter the ground forces inventories of West Germany and Great Britain, the following year--those of France and Italy. It is expected that the maximum production capacity of 72 launchers and 30,000 rockets per year will be reached in 1990. Shown in the table is the production program based on armed forces requirements of the European NATO countries.

MLRS Production Program for European NATO Countries

Country	Quantity of Armament Output			Participation (percent)
	MLRS RS-30	Free-flight Rkt w/M77	Free-flight Rkt w/AT-2	
West Germany	200	65,000	20,000	50
Great Britain	67	48,000	-	26
France	55	32,000	-	18
Italy	20	5,400	600	6
Total	342	150,400	20,600	100

The program for development and production of the MLRS in the European countries is estimated at three billion dollars. The NATO member nations are expected to begin exporting the RS30 after equipping their armed forces with it. Already about 30 countries (including Egypt, Saudi Arabia, Japan, Thailand, Pakistan and a number of West European countries) have expressed an interest in acquiring the RS30. Foreign experts believe the cost of the entire production program (including export deliveries) could reach 7-10, even 20 billion dollars. By agreement among corporation partners, 65 percent of export orders will be filled by the U.S. firm, 35 percent by its European partners. The U.S. will exercise the right of veto with respect to sale of the system to all countries outside the NATO alliance; Great Britain, France, West Germany and Italy--only for European countries not belonging to the North Atlantic bloc.

Visitors to the arms exhibition at Farnborough (Great Britain) in September 1986 were able to see the RS30 MLRS system for the first time--the latest offspring of the NATO militarists who are continuing to drive the arms race.

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CSO: 1801/182

PAKISTAN: A MILITARY-GEOGRAPHIC OVERVIEW

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 87 (Signed to press 3 Apr 87) pp 68-74

[Article by A. Samarskiy: "Pakistan: A Military-Geographic Overview"]

[Text] The Islamic Republic of Pakistan is located in the southern part of the Asian continent. It was formed in 1947 as a result of a split in the former British colony of India into two nations. In 1971 Eastern Bengalia seceded, its people having engaged in a prolonged struggle for independence, and formed the sovereign state of Bangladesh.

The political direction of Islamabad in recent years is characterized by a constant growth of militarization, exacerbation of relations with her neighboring states, and expansion of military and political cooperation with the United States, its NATO allies and the reactionary regimes of Moslem countries. All of this has transformed Pakistan into one of the major platforms for imperialist expansion and subversive activities against socialism and national liberation movements in the region. The major groupings of Pakistani troops are in regions close to her border with India.

Physical Geography. The area of Pakistan comprises 804,000 square kilometers. The territory of the country extends more than 1600 km north to south and about 890 km east to west (fig 1). Pakistan borders on Iran, Afghanistan and India. The Pakistani government currently exercises control over a significant portion of the Indian states of Jammu and Kashmir, which have a common border 595 km long with the People's Republic of China. To the south Pakistan borders on the Arabian Sea over a distance of 830 km.

Over half the territory of Pakistan consists of mountains and plateau--spurs of the Himalayas and Gindukush in the north (the highest point is Mount Tirich Mir, 7690 m) and parallel ridges for the most part up to 3500 m in altitude (Mount Zargun, 3578 m), the ridges and plateaus of the Iranian highlands in the west. To the east and southeast of Pakistan stretch the Indian lowlands, occupying approximately 16,000 sq km of arable land and extending eastward to the Tar Desert, northward to the Tkhal Desert.

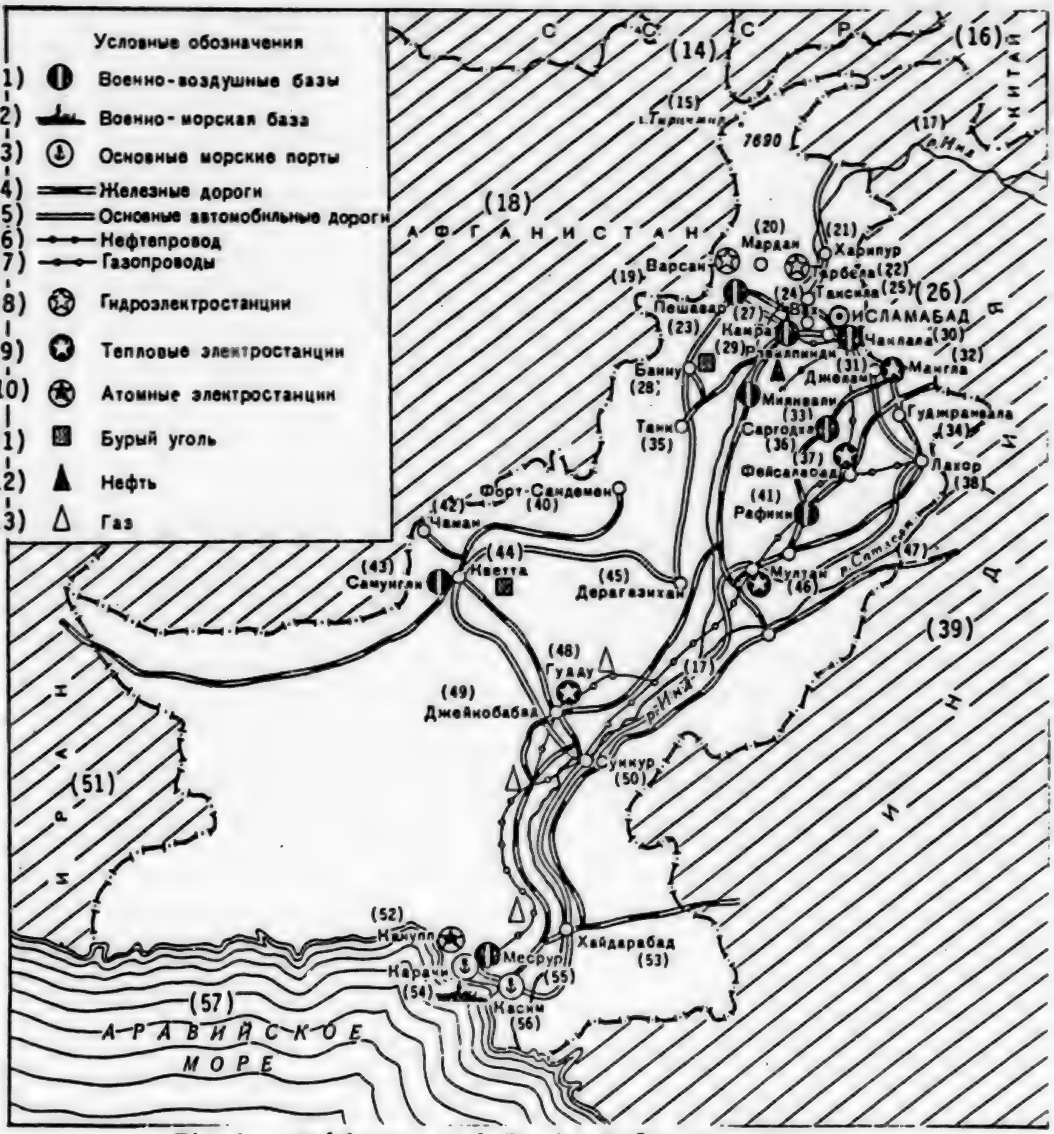

Fig 1. Pakistan and Basic Infrastructure.

1. Air force bases
2. Naval base
3. Main seaports
4. Railroads
5. Major roads
6. Oil pipeline
7. Gas pipeline
8. Hydroelectric power plants
9. Thermal pwr plants
10. Nuclear pwr plants
11. Lignite
12. Oil
13. Gas
14. USSR
15. Mt Tirich Mir
16. China
17. Indus River
18. Afghanistan
19. Varsak
20. Mardan
21. Kharipur
22. Tarbela
23. Peshawar
24. Vakh
25. Taksila
26. Islamabad
27. Kamra
28. Bannu
29. Rawalpindi
30. Chaklala
31. Jelam
32. Mangala
33. Mianwali
34. Gujranvala
35. Tank
36. Sargodha
37. Faisalabad
38. Lahore
39. India
40. Fort Sandemen
41. Rafiki
42. Chaman
43. Samungli
44. Kvetta
45. Deraghazikhan
46. Multan
47. Satlej River
48. Guddu
49. Jeykobabad
50. Sukkur
51. Iran
52. Kanupp
53. Hyderabad
54. Karachi
55. Mesrur
56. Kasim
57. Arabian Sea

Most of Pakistan's rivers are situated within the Indus River basin. Rivers in the country's western regions flow into the Arabian Sea. A significant portion of river water is used for irrigation. For example, Pakistan's share of the largest single irrigation system in the world, the Indus and its tributaries, comprises 40 percent of the flow. Pakistan's hydrologic cycle is a changeable one. The water level in the summer-fall period rises by 20-30 m in mountainous regions, and by 3-10 m in the plains. Floods are often accompanied by catastrophe. Pakistan's rivers become significantly more shallow in the winter and spring; some dry up completely. As a result, navigation is possible only on certain portions of the Indus and its eastern branch, the Sutlej River. Pakistan has a few lakes.

Most of the country has a tropical climate. The northwest is subtropical, dry, continental. The year has three seasons. Precipitation in the rainy season (July-September) amounts to 50-500 mm, except in the mountainous regions where it reaches 1500 mm. The cold season (October-February) is characterized by settled weather, temperatures from 11-19 degrees Celsius, frequent nightly frosts and freezing weather in the mountains, down to -20 degrees Celsius. The average temperature in the hot season (March-June) is 30-35 degrees Celsius (a maximum of 52.2 degrees was registered in Jacobabad, in the central region of the country).

The vegetation of Pakistan is basically desert, semiarid grassy steppe and scrub regions. Acacia and tamarisk forest is found in the river floodplains. Man-made plantation covers the shores of irrigation canals. The mountain slopes have leaf-bearing trees and coniferous woods are found at altitudes above 2000 m.

Population and State System. Pakistan's population in 1986 was 98 million, over 52 percent male. Average annual population growth is about 3 percent, average density--122 people per sq km. About 72 percent of the population lives in rural areas. Among the major cities and their populations are Karachi (5.2 million), Lahore (2.9 million), Faisalabad (1.1 million), Rawalpindi and Hyderabad (0.8 million each), Multan (0.7 million). The capital is Islamabad, with a population of more than 200,000.

The national composition of Pakistan is non-homogeneous. More than 20 nationalities have settled in the country. The most numerous of these are the Punjab, Sindhi, Pushtu, Beluji and Bragu. Pakistanis speak in a variety of languages and dialects. The official language is Urdu, but English is widely spoken.

The population is divided by religious category into Muslim (over 97 percent), Christian (less than 3 percent), and other groupings highly insignificant in number. The state religion is Islam.

Pakistan is a federated republic consisting of four provinces (subdivided into regions, districts and regional municipalities), a federal capital district and tribal zone. According to the 1973 constitution (amended and supplemented in 1984-1985) the president is the chief of state, elected to a five-year term by members of parliament. The parliament is endowed with limited legislative

powers. It consists of two houses--the senate (upper) and national assembly (lower). The senate is comprised of 83 deputies, of which 72 represent the legislative assemblies of the provinces, 5--the tribal zones, 2--the capital district and 4--religious minorities and women. Deputies are elected to a six-year term. Elections are held every two years, at which time one-third of the senate composition changes. The national assembly consists of 237 members, also elected to a six-year term. Executive power is formally vested in a government comprised of a prime minister and more than 20 cabinet and state ministers. In actuality, supreme legislative and executive power has been wielded by the military council since 1977.

In charge of each province is a governor who appoints the prime minister and other ministers of the provincial government and approves legislation passed by the provincial assemblies. Regional government is effected through commissars, district--through deputy commissars, and regional municipality--through administrators. The tribal zone, located in the northwest border province, is governed by special representatives appointed by the president.

Pakistan's current president, General Zia-ul-Haq, came to power as a result of a military coup in June 1977. At that time the country was going through a political crisis, brought about when social and economic measures introduced by the cabinet of Z. A. Bhutto met with stiff resistance from reactionary circles and were accompanied by a civil disobedience movement and flashes of violence. After the seizure of power, martial law was declared for a period of 90 days. It remained in effect, however, for more than eight years and was only rescinded on 30 December 1985. The elected federal government was disbanded. Leaders of the ruling Pakistani People's Party underwent repression. General elections and the return to democratic forms of government promised by the military administration were repeatedly postponed. Moreover, measures were taken to create the appearance of observing legality and democracy. Thus, a provisional civilian government was formed in 1978 with the participation of party leaders who supported the military regime and General Zia-ul-Haq became president. All of this was of a diversionary nature and used to strengthen the position of the military. A referendum was conducted in the country in 1984, as a result of which Zia-ul-Haq obtained an extension of his term of office as president for another five years, this under the pretext of continuing on the road towards Islamification of all aspects of life and accomplishing political reforms.

After elections to the national and provincial assemblies in 1985, conducted in violation of the constitution and guaranteeing victory to supporters of the regime, an appreciable opposition began to form in local organs of power. In order to suppress it, Zia-ul-Haq confirmed a number of amendments to the constitution of 1973 which gave the president practically unlimited power.

All political parties were formally disbanded in 1979. In fact, however, they continue to conduct limited political activity. The very powerful Pakistani People's Party expresses the interests of the small and middle class bourgeoisie of the city and village. The Pakistan Musselman League comprises parties advocating right-wing bourgeoisie and religious communal doctrine. It is split into several factions. The national democratic party, formed in 1975, adheres to a democratic orientation. Jamaat-i-Islami is a reactionary

religious-political organization. The Communist Party of Pakistan was formed in 1948 but since 1954 has been operating deeply underground. Other political organizations and a number of unions are also active within the country.

The Economy. Pakistan is an agrarian country with a developing industry. About 25 percent of the gross national product can be attributed to agriculture, 20 percent to industry. In 1986 the country's gross national product amounted to 32.6 billion dollars, or 333 dollars per capita.

The sixth five-year plan for economic development, undertaken in 1983, envisages an average annual growth in gross national product of 6.5 percent. The Pakistani press reports, however, that there is an appreciable lag in plan execution due to the effect of weather conditions on agricultural production. Total expenditures for plan realization were determined to be 37 billion dollars. Over 40 percent of the expense was expected to be covered by owners of private firms to whom was relegated the basic role of financing most of the program, especially in the sphere of material production. The state-owned sector is to set up the necessary economic infrastructure for attracting private capital. External financial aid totalling five billion dollars is also projected.

According to western economists, the sixth plan for development had from the very beginning a propagandistic nature, insofar as state resources are limited, and attracting private capital is difficult due to distrust on the part of most bourgeoisie elements towards the military regime. After the first two years of plan implementation, fulfillment has lagged 9-10 percent behind projected indices.

According to official statistics, the economically active population totalled 28.8 million in 1986 (about 30 percent of the country). About 27.8 million people are engaged in various forms of activity. More than half work in agriculture, 13 percent are engaged in industry, 24 percent--in trade and services, about 5 percent--in construction, almost 5 percent--in transportation, less than 2 percent--in energy resources and gas supply. The level of unemployment has reached almost 3.5 percent. Pakistan has a very low level of women's employment--a little more than 2 percent, or less than one million women.

The country's raw material and energy resources have not been studied sufficiently and they play a small role in the national economy. Extractive industry comprises 1.4 percent of the gross national product. Confirmed deposits of basic raw material resources are estimated as follows (figures are in millions of tons): iron ore--more than 430, copper ore--412, chromites--4, bauxites--more than 74, barites--5. Of non-ore resources: rock salt--more than 100, phosphorites--23, sulfur--1.

Pakistan's fuels and energy profile for 1985 shows 38.4 percent of the total attributable to oil, 36.3 percent to natural gas, 5.7 percent to coal, 18.7 percent to hydraulic power, 0.4 percent to nuclear energy and 0.5 percent to other energy sources.

Pakistan has confirmed oil reserves in the amount of 14.9 million tons. Average annual oil extraction in the 1980's (0.6 million tons) satisfies about 14 percent of the country's requirements. Oil imports in the amount of 4-4.5 million tons cover the remainder. Natural gas reserves are estimated at 436 billion cubic meters, and the average annual extraction volume amounts to about 10 billion. The major oil deposits are located in the northeast part of the country, in the area around Rawalpindi; the gas comes chiefly from the Indus River basin near the city of Sukkur. Coal resources total 606 million tons. Pakistani coal is not of high quality, and is used chiefly as industrial fuel. An annual volume of 1.6 million tons of coal is extracted in the province of Belujistan. Uranic ore deposits are mined in the region around the city Dera Ghazi Khan.

According to Western economists, the production of electrical energy significantly lags behind the country's needs. Of the 5.5 million kilowatts produced by electrical power stations in 1985, about 94 percent was attributable to state-owned power plants, the most predominant of which (with output rendered in thousands of kilowatts) are: Tarbela Hydroelectric Power Plant (1400), Mangla HPP (800), Varsak HPP (240); Guddu Thermal Electric Power Plant (439), Multan TEPP (266), Faisalabad TEPP (200). The country's only nuclear power plant is operated in Kanupp (137) near Karachi. In 1985, 24 billion kilowatt hours of electrical power was produced--58.5 percent at hydroelectric power plants, 40 percent at thermal electric power plants, and 1.5 percent at the country's nuclear power plant. Plans call for the construction of 13 power facilities prior to 1988 which would deliver a total output of up to 8.2 million kilowatts. These efforts are being delayed, however, due to insufficient financial resources.

The manufacturing industry consists of over 3800 enterprises (according to the 1981 census). More than 80 percent of these have 100 or fewer employees; somewhat over 11 percent have up to 500 employees, and about 6 percent are major enterprises.

Light industry and the food industry are of key importance in Pakistan. They account for more than half the country's fixed net product while the base branches comprise less than one third. The main industrial centers are Karachi, Rawalpindi, Jelam, Lahore, Peshawar and Faisalabad.

The metallurgy industry encompasses over 200 plants, the largest of which is the metallurgy complex built in Karachi with the assistance of the Soviet Union, producing 1.1 million tons of steel per year. There are also 24 smaller steel-smelting plants with total output of 0.7 million tons per year, 21 rolled-metal production plants (600,000 tons per year), over 150 small-scale enterprises for the manufacture of ferrous metal products, and 14 non-ferrous metallurgy enterprises. In addition, there are more than 270 metal ware plants. The major centers of this industry are Karachi, Taksila, Kharipur and Lahore.

The machine building industry encompasses over 600 enterprises, mostly small ones, which produce agricultural equipment, textile looms, motor transport and electrical appliances. These enterprises are concentrated in Karachi, Lahore

and Taksila. The largest of these, a heavy machine building complex, is found in Taksila. Karachi has a machine tool plant, shipyard and motor vehicle plants.

Petroleum processing is accomplished at two Karachi plants for imported oil (with annual yields of 2.5 and 2.1 million tons) and a plant near Rawalpindi (1.8 million tons per year) for domestic oil resources. The chemical industry is represented by nine fertilizer-producing enterprises (total output--more than one million tons per year) and over 100 firms producing industrial chemicals, petro-chemicals, paints, varnishes and industrial rubber, located in Karachi, Multan, Faisalabad and other cities.

The building materials industry encompasses 13 cement plants with total output of more than five million tons per year, three brickyards (construction of four more is underway), three asbestos cement plants, and about 70 enterprises which produce glass, fittings and accessories, reinforced concrete products, fire-resistant materials, etc. The main centers of this industry are in Karachi, Dera Ghazi Khan, Vakh and Hyderabad.

Pakistan's light industry includes more than 1300 textile, sewing and leather-shoe enterprises and carpet factories. These account for about 30 percent of the industrial production value and provide up to 45 percent of the country's export revenues. Production capacity of this branch of industry amounts to more than 600,000 tons of cotton yarn, 650,000 meters of cotton fabric, more than 3 million square meters of carpet, about 80,000 tons of jute articles, and up to 55 million square meters of leather. Branch enterprises operate under capacity, sometimes reaching 70 percent, and production of fabric in the 1980's has been curtailed 5 percent per year on the average as a result of protectionist measures taken by the developed capitalist countries. The main centers of light industry are Karachi, Lahore, Multan and Faisalabad.

After light industry, Pakistan's food industry is next in order of importance. Pakistan has 39 sugar plants (with output of about 1.4 million tons per year), 44 plant and vegetable oil plants (666,000 tons), about 200 milling and grinding enterprises (5 million tons), and 57 rice processing factories, canneries and other enterprises engaged in output of food and tabacco products.

Military Production. (Editor's note--for more detailed information on Pakistan's military production, see ZARUBEZHNOYE VOYENNOYE OBOZRENIYE, 1985, No 10, pp 17-22). Pakistan's first small arms and ammunition plant was built at the beginning of the 1950's. Its production capacity satisfied only to a small degree the needs of the country's armed forces. In order to reduce dependence on the import of arms and military technology, the government adopted measures in 1965 to organize its military production effort. Today relatively large-scale state plants subordinate to the ministry of defense are responsible for part of Pakistan's military production. Additionally, private sector enterprises are also working to satisfy the needs of the armed forces.

Pakistan produces light auxiliary aircraft, escort ships, recoilless guns, mortars, small arms, communications equipment and ammunition, chiefly under Western license, and effects repair of various types of military equipment.

The country's military industry fully satisfies the needs of her armed forces in producing recoilless guns and mortars, small arms and ammunition. Enterprises are concentrated in Vakh (artillery ordnance and ammunition production, major tank overhaul), Kamra (assembly and repair of aviation equipment) and Karachi (shipbuilding and repair, motor vehicle transport production, mortar production, aircraft repair). It is expected that domestic production of rockets and missiles, domestic assembly of tanks and jet fighters will be achieved at some time in the future.

Agriculture is the leading sector of Pakistan's economy. According to Pakistani press reports, however, it does not completely satisfy the country's requirements for food and industrial raw materials. Farming, which accounts for up to 70 percent of the agricultural production, is characterized by a low level of agricultural technology and a heavy dependence on weather factors. The land is concentrated mainly in the hands of exploitive landowners. Over 31 million hectares of land are suitable for agriculture but only 20 million hectares are under cultivation, of which over 19 million are irrigated. Fertilizers are not used to a great extent. Agricultural output for 1986 (yield in thousands of tons) includes: wheat (13,426), rice (2957), corn (1009), barley (132), millet (476), sugar cane (26,912), rape (237), cotton (1209) and tobacco (100).

Livestock breeding plays a role of secondary importance. The livestock population in 1986 included 29.6 million head of cattle, 25 million sheep, 29.7 million goats, 910,000 camels, 450,000 horses and about 114 million poultry. About one million tons of meat and 10-11 million tons of milk are produced each year. Fish and other sea products play an important role in feeding the population--the annual catch amounts to 350,000 tons.

Transport. Motor vehicle and railroad transport accounts for the largest volume of domestic shipping and forms the basis of Pakistan's transportation system. Foreign trade shipments are undertaken primarily by sea, and to a lesser extent--by air transport.

Pakistan has more than 104,000 kilometers of roads, of which about 45,000 km are paved with asphalt. Average road network density does not exceed 13 km per 100 sq km. The number of motor vehicles amounted to 540,000 in 1986, including 405,000 cars. Motor vehicle transport provides over 80 percent of passenger transportation and more than 70 percent of domestic freight shipments. The most extensively used road is the Peshawar-Karachi highway, which accounts for more than half of all motor vehicle shipment.

Pakistan has 8800 km of railway of which about 600 km is narrow-gauge. The major railways (mostly single-track) extend in the same directions as the roads. Only a small portion of the railroads are electrified. In 1985 the country had 965 locomotives, 3000 passenger cars and 36,000 freight cars. The Pakistani press reports that most of the country's rolling stock is outdated and needs to be replaced. Railroad shipment volume is therefore three to four times lower than motor vehicle shipment and is constantly decreasing. Construction of a second track over the most extensively utilized segments is planned as part of a program of rail transport development which also envisages domestic production of diesel locomotives.

Pakistan's merchant fleet consisted in 1986 of 37 ships, with total dead weight of 613,000 tons. This accounted for about a fifth of the country's foreign trade shipments. The only seaports are Karachi and Kasim (40 km southeast of Karachi), capable of processing 16 and 10 million tons of cargo per year respectively. Actual levels for 1986 were 15.7 (Karachi) and 3 (Kasim) million tons.

Air transport provides mainly international airline service for travellers. In 1986 the sole airline company in the country, the state-run Pakistan International Airlines, had 42 aircraft in its inventory, including 6 Boeing 747. Last year 7.5 million passengers and 200,000 tons of cargo were transported through Pakistan's airports. The major airports are Karachi, Lahore, Rawalpindi and Peshawar.

Pakistan has over 1650 km of gas pipeline. The pipeline network supplies major cities with gas from locations of deposit in the central part of the country. The country's oil pipeline extends 105 km and joins the oil deposits of Dkhuliyan with the oil processing plant at Rawalpindi.

According to foreign press reports, Pakistan's armed forces number 480,600 men (regular armed forces)--450,000 ground forces troops, 17,600 air force and 13,000 navy. In addition, the country has border troops and other military-oriented groupings totalling 164,000 men. There are 513,000 reservists. About 30,000 Pakistani servicemen serve on loan with the armies of Persian Gulf countries, including 10,000 in Saudi Arabia. The armed forces are constituted on a voluntary basis. A two to seven year contract is signed with individuals 17 years of age or older.

The president is the commander-in-chief of the armed forces. The ministry of defense and a military council under the president serve as the main elements of military high command. The defense minister directs the armed forces through his first deputy, a joint committee of chiefs of staff, a defense committee and other agencies. Subordinate to him are the commanders of the armed forces services, who are also the chiefs of staff of their respective services.

The ground forces are the main service of Pakistan's armed forces. They consist of 7 army corps headquarters, 17 infantry divisions, 2 armor divisions, 8 infantry brigades, 4 separate armor brigades, 8 artillery brigades, 3 air defense artillery brigades, 6 reconnaissance regiments, a special forces group, and 5 army aviation squadrons.

The ground forces inventory currently includes about 1600 tanks (including more than 1000 type-59), more than 1450 field artillery pieces, mortars, anti-tank weapons (including about 300 TOW missiles), about 100 army aviation helicopters, and other armament.

The air force encompasses three regional commands (Northern, Central and Southern) and an air defense command. The air force is comprised of 19 fighter, 1 reconnaissance and 2 transport squadrons, training and helicopter squadrons, 6 Krotal guided missile batteries, and 1 SA-2 battery. It contains 375 combat aircraft (including those at training centers), 42 guided missile

launchers, and more than 170 auxiliary aircraft and helicopters. The air force has a fairly well developed network of airfields at its disposal. The major air bases are at Chaklala, Kamra, Peshawar, Mianwali, Sargodha, Rafiki, Samungli and Mesrur.

Air defense is organized by sector--northern (headquarters at Peshawar), southern (Mesrur), western (Kvetta), and central (Sargodha). Airspace management is provided by fixed and mobile radars of British and American construction. Since 1985 an automated air defense management system has been in operation, established with the assistance of American firms.

Pakistan's navy consists of 9 destroyers, 9 submarines (including 3 midget subs), 3 minesweepers, 25 combat craft and 11 auxiliary ships. Naval aviation includes 3 base patrol aircraft, 6 anti-submarine and 4 search-and-rescue helicopters. The navy is tasked with securing and defending Pakistan's coastline and maintaining lines of communication between the Arabian Sea and the Persian Gulf. The chief naval base is at Karachi.

Pakistan's military-political leadership is devoting significant attention to modernizing her armed forces. The greatest portion of budget appropriations is allocated for military purposes. In fiscal year 1985/1986 this amounted to 35.1 billion rupees (2.2 billion dollars), or 27.2 percent of total expenditures. Military expenditures programmed for FY 86/87 total 38.7 billion rupees (2.4 billion dollars), a 10 percent increase over the preceding year.

The magazine Far Eastern Economic Review notes that Pakistan's budgetary allocations are directed chiefly towards current expenditures--monetary payments, maintenance and operation of military facilities, logistical and technical maintenance support, etc. Arms purchases are not usually reflected in the budget, insofar as they are financed through external sources. Thus, U.S. military and economic aid to Pakistan over the period 1981-1986 constituted 3.2 billion dollars and is planned to reach 4.02 billion for the period 1987-1992. About half of all the American aid is used for the purchase of modern armament and development of the military infrastructure.

According to foreign press reports, expected deliveries from the United States include 3 distant early warning and control aircraft (E-2C Hawkeye), 16 Harpoon missiles, and equipment for modernization of fighter aircraft of Chinese manufacture, about 100 of which have been purchased. Negotiations are underway with respect to purchase of a new complement of F-16 fighters. Saudi Arabia financed delivery of the first 40 F-16's, granting Pakistan 500 million dollars for this purpose. Fighter delivery (60 aircraft have been ordered) from China has begun. In addition, an agreement has been reached on the construction of three guided missile frigates of the Amazon variety (two to be built in Great Britain, the third--in Pakistan with British technical assistance).

The militarization of Pakistan conforms to imperialism's plans with respect to southern Asia and the Indian Ocean. Arms deliveries, the construction of military infrastructure facilities and the training of Pakistani servicemen are all integral components of Washington's neo-global policies, directed

towards consolidating its military-strategic posture in the region and establishing a connecting link in its chain of platforms of aggression along the USSR's southern boundaries--from Turkey to South Korea and Japan.

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NEW ITALIAN CLUSTER BOMB

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 87 (Signed to press 3 Apr 87) p 77

[Article by Colonel I. Karenin: "The New Italian Cluster Bomb"]

[Text] The Italian weapons consortium CASMU (Consorzio Armamenti Spendibili Multo Uso) has developed an air-droppable cluster bomb designed for destruction of fixed ground targets, to include aircraft take-off and landing strips, taxiing runways and hardstand, transfer points, shipbuilding yards, bridges and crossings. According to foreign press reports, two basic types of cluster bomb have been developed--without a propulsion system, and with rocket engine. Both variants are equipped with an autonomous guidance system which provides controlled flight after being dropped from the aircraft at low altitudes. Basic features of the cluster bomb are as follows: total mass--1050 kg (1170 with rocket engine); warhead mass--745 kg; flight range--6 to 12 km (20 to 25 with rocket engine); maximum speed--Mach 0.8; length--4.76 m; wing span--1.5 m.

Western press reports note that in developing the cluster bomb, special attention was devoted to reducing the possibility of its detection by enemy radar. Efforts were made to select the optimal external contour with the aim of decreasing effective scatter area, and to use special absorptive coatings in its construction. The warhead module may be charged with small-gauge ammunition of various types and purposes, such as concrete-piercing bombs, anti-tank, anti-personnel and anti-vehicle mines which may be fired from the cluster at time intervals set prior to the mission. Proposed carriers for the bomb cluster are the Tornado, AMX and F-16 Fighting Falcon tactical fighters, and the A-4 Skyhawk and A-7 Corsair-2 ground attack aircraft.

Both types of bomb cluster are currently in the final stage of development and flight tests are scheduled to begin at the end of 1986. It has also been reported that Italian experts are examining the possibility of developing yet another variant of the bomb cluster, one outfitted with a turbojet engine.

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